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APRIL 1957—35 CENTS

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INTERNATIONAL COMPETITION NEWS

► The winter meeting of the FAI Model Committee recently was held in Europe. Official word is slow in reaching AMA headquarters, but we have been advised by unofficial letter that the following was voted and adopted.

The four international events will now be held on a two-year basis. Most countries find it financially difficult to field four teams a year. By the new system ony two teams will be fielded a year. The two finals events for 1957 will be Nordic and Speed. These will be held in Czechoslovakia in August, 1957. The two finals events in 1958 will be Power and Wakefield.

The United States will alter its announced elimination system to conform to this ruling. The dates as announced in the February issue will be changed as follows: 1957 Speed Eliminations, May 25, 1957; 1957 Nordic Eliminations, May 26, 1957; 1957 Nordic Semi-Finals, July 16, 1957.

The August Elimination dates to select the 1958 team will not be changed, they remain: 1958 Power and Wakefield Eliminations, August 24-25, 1957; 1958 Power and Wakefield Semi-Finals, September 28-29, 1957.

Model specifications for Speed and Nordic will remain unchanged during 1957. Power and Wakefield rules will be altered as most of you know. A member-country vote is in progress to determine what these rules will finally be, and will be announced.

Nordic eliminations will be held in the following cities in May. Speed eliminations will be held in cities where there is interest.

Baltimore, Md.
Bloomington, Ind.
Boston, Mass.
Chicago, Ill.
Cleveland, Ohio
Columbus, Ohio
Dallas, Texas
Detroit, Mich.
Galesburg, Ill.
Los Angeles, Calif.
Miami, Fla.
Minneapolis, Minn.
New York—Philadelphia
Norfolk, Va.
Omaha, Neb.
Sacramento, Calif.
Santa Barbara-Bakersfield, Calif.
Seattle, Wash.
Tulsa, Okla.
Wichita, Kans.
Nashville, Tenn.

The IC Committee regrets changes in its program, but the changes were due to factors beyond its control. Next month we shall discuss the airplane trip which will be used to finance our teams entry in the 1958 Finals.

Ed Dolby
INTERNATIONAL COMPETITION COMMITTEE of the AMA.

27th Year of Publication

MODEL AIRPLANE NEWS

JAY P. CLEVELAND, President and Publisher

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by
William
Winter

► Lo and behold, the FAI has stopped the sun in the sky. There will be no Wakefield contest this year. Instead, as both Dolby and Chinn write in this issue, Nordic and Speed will be held in '57, then Wakefield and Power in '58. How to manage the four international events on a yearly basis has proved a too thorny problem, in no way the fault of FAI. No one has, nor probably ever will, come forward to volunteer to put on the so-called Model Plane Olympics, and no nation has backed modeling officially to the point that four teams can be sent to cities scattered all over a continent. So, maybe, an every-other year schedule makes sense. Still, if you do hold anything, can you leave out the Wakefield, traditionwise, the great and oldest of all events?

No one here will be trampled to death in the rush to compete for glider and speed. Speed eliminations, it is to be noted, will be held in cities where there is interest. How vague can this get? Possibly, we'll make it two years in a row—two world last's that is! Why not just invite the better speed fliers who want to go? The next time round, if there is one, why not use the Nationals for the eliminations, as we used to do so happily. The every-two-years schedule certainly permits this.

As to the plane specifications, the proposed elimination of take-offs—why is it that landing gears and take-offs are objectionable after about 30 years of international competition? The changes will complete the evolution of the Wakefield model into a stick job. Lord Wakefield could have saved us all time by calling for stick models in the beginning. But, of course, no one would have built them. Jim Cahill's Clodhopper, Bob Copland's streamliners, were magnificent airplanes that put to shame these dratted pogo-sticks. Quick, bud, why were the rules changed? And for gosh sakes, don't call it progress.

• • •

► Now that we have eight-channel radios and planes that roll on ailerons, magnetic wheel brakes and flaps, the well-heeled multi boys are crying for 10, even 12 channels. One leading manufacturer who made his rep on multi, just introduced a single-channel outfit, is awed to find that the rudder boys outnumber the wild men by 12 to 1. High against a blue sky, a yellow crate looks as purty on one channel as it does on 10.

• • •

► In the ten years that this column has been doing business, have often felt like a (*Continued on page* 7)

NEXT MONTH'S COVER
Great Lakes Trainer

PLANE ON THE COVER

Jo Kotula's striking portrayal of a sub-launched guided missile, Chance Vought Regulus, dramatizes seldom-mentioned but nevertheless potent atomic air threat to seaboard cities anywhere. Span 21 ft., length 33 ft. Power, an Allison J33 turbojet. It is a surface-to-surface missile.

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MAN at Work

(*Continued from page 4*)

wrestler in a tag team match. Recommending gas engines in Wakefield models, charging that free flights are in a rut, and so on, requires an ability to break a full Nelson. But it isn't the free-for-all arguments that throw you (after all, the guy with the printing press does have a slight advantage) but it is the apparent importance of any column to a great many people all over the world that chops you down to an .02 displacement. Every time you pull the trigger there's an avalanche of breaking dishes somewhere off in the wings. People take over the thing—it is their's and not yours. Modelers in numberless exotic nameplaces weigh every worthless word; balsa butchers you've never met, nor will ever know, call you (the magazine) friend—almost wrote that fried! The "small-world" happenings awe you. R. R. Smith, for example, shuffles along a road in Banff, Canada. He comes to a copy of Model Airplane News lying in the dust, takes it home, finds out about glow plugs, radio control, fuels in tins, jet engines, so resumes modeling after a lapse of 17 years. A few hundred instances like this and you need to be pull tested. And here is O. G. Corben, operating fishing cruise boats out of Florida, who just read Chuck Wood's article on the Corben Super Ace. Watch the way these things spin out.

O. G. Corben was one of the great home-built airplane pioneers of the twenties and early thirties. His designs got world-wide attention. In fact, a national magazine recently ran modernized plans on building a Corben and now dozens of Corben's are flying again.

"A friend showed me the September issue of Model Airplane News," explains O. G. "The article was well written, not just the cut and dried, how-to-build-it.

"Mr. Wood says 'this big ship and model proportions never have more ideally coincided.' The truth is that all Corben sport planes were first built as a flying model, each model flown and changes made until the desired results were obtained. Then the full-size plane was scaled up from the model. The big plane could be flown with throttle settings only and, in demonstration flights of the two-place Junior Ace, I used to take off, make a straight line flight and land, using only the throttle.

"I mention this to prove that model building has more value than most people realize, even the builder himself, and I am pleased to know that some of my efforts have helped both men and youngsters to further this wonderful hobby."

• • •

► About the time the birds fly north each year, Leo Holliday, extolls the Texas deeds in speed, then winds up with the sermon for the week. (You'd better take heed!) The speeds? Bob Shelton, 150.44 with stock Dooling .29. Wayland George, Dallas, 165.22 in jet, 1/100th second faster on total of three watches than Dave Cottons. How would you like to call that one? Jim Payson (ain't you from Wichita, Jim?), 167 plus with a C class side winder.

"I have seen speeds go up for the last few years," affable Leo adds, "but we still have no chance to take care of pull. Good thing Vic Stanzel designed his Mono-Line speed stuff with an extra safety factor. Pull tests are not the answer. Just makes ships more unsafe when they are pulled more G's." Recall J. C. "Madman" Yates saying this eight years ago at Olathe.

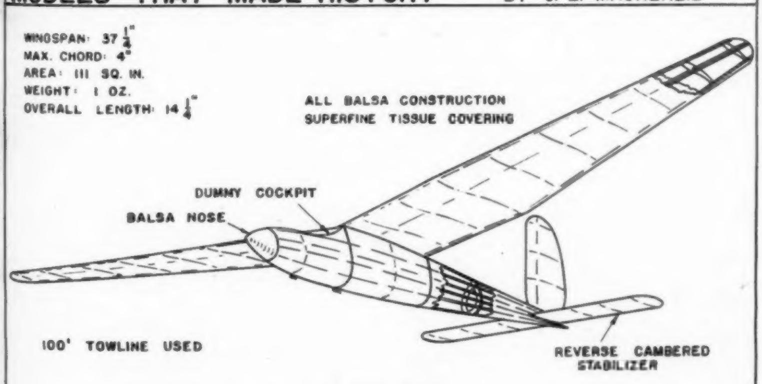
What made Leo blow his gasket though was a magazine campaign to have Doc Good written in on ballots for AMA pres. No nicer or more talented guy exists than old friend Walt, but us printing press guys have enough of our own problems without dabbling in AMA policies Keith Storey a one-time presidential steady, remarked. "I don't understand why any one wants these headaches." Anyway, the new pres is Claude MacCullough, an equally nice and talented guy. Which proves something or other.

• • •

► Stationed in Tokyo (Headquarters, First Cavalry Division), Chuck O'Donnell just can't get over the flying space in Korea, according to a newspaper clipping, because in the Japanese city the modelers have two places to fly: The MP Motor Pool and the local graveyard. Chuck has a buddy who flew a Fox 35 Cougar in the graveyard on 26-foot lines. Hasn't been the

(*Continued on page 44*)

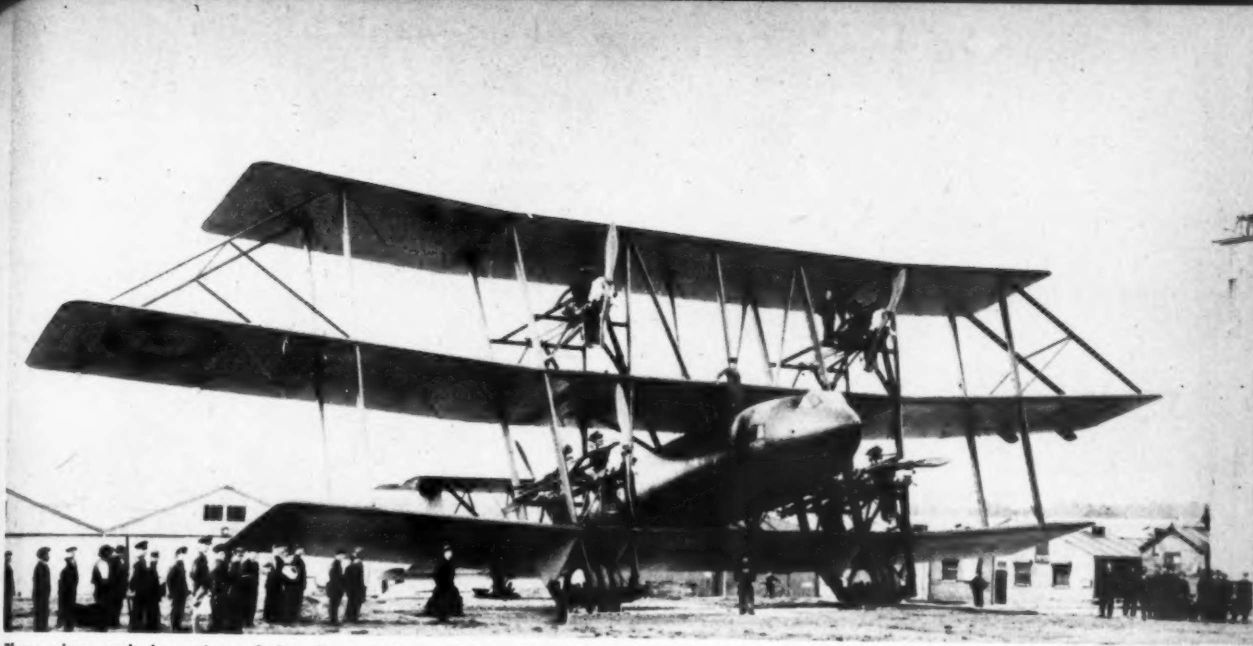
MODELS THAT MADE HISTORY — BY J. L. MACKENZIE



GLIDER DEBUT

NATIONAL MODEL AIRPLANE MEET
AKRON, OHIO — JUNE 28, 1934

MODEL GLIDER FLYING FIRST BECAME POPULAR IN 1933. IT FIRST APPEARED AT THE NATIONALS IN A TOWLINE EVENT IN 1934. ROBERT FILE OF COLUMBUS, OHIO WON THAT CONTEST WITH A NATIONAL RECORD OF 23 MIN. 13 SEC. WHICH WAS NEVER BROKEN IN ITS SPECIFIC CLASS. HIS MODEL, SHOWN HERE, WAS PATTERNED AFTER THE MAN CARRYING SHIPS OF THAT TIME.



Three wings and six engines of the all-wood Tarrant Tabor of 1919 was an impressive try. Picture from Imperial War Museum, of London.

Early Giants

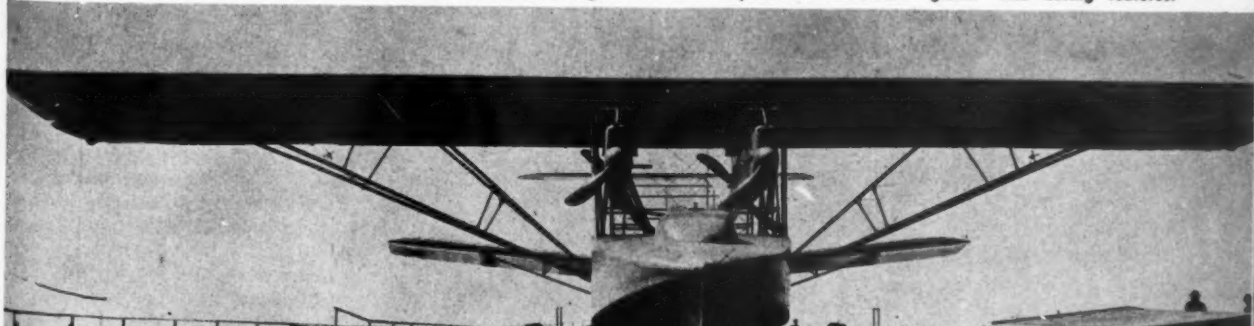
by ROBERT C. HARE . . . *Long since gone and all but forgotten, are these amazing aircraft of 25 to 40 years ago. Some were brilliant, most successful, and all pointed the way by at least showing what not to do.*

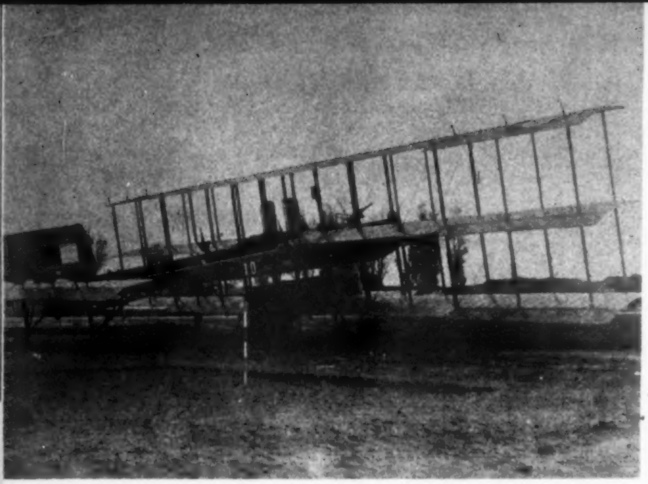
► One of the most interesting, yet least known phases of World War I aviation development concerns the attempts of several nations to perfect outsize aircraft. These ships, all of prodigious dimensions, even by today's standards, were all the more amazing in view of the fact that they were designed and built scarcely a dozen years after the Wright Brothers' first flight!

The problems they presented were many. As a result, we also find applications of various other sciences for the first time in aviation. These giant aircraft involved their designers with unusual structural problems; brought to aircraft new materials, untried powerplant arrangements, and an application of odd—for aircraft—mechanical devices. For the first time designers were faced with and developed ancillary power systems, multiple fuel systems and complicated electrical systems.

Most prolific experimenters with large aircraft were the Germans, who built and flew at least 17 different designs. They did not have the monopoly, however. England produced a number

Huge German Dorniers—this an Rs 2A, with all-metal frame, four engines in tandem pairs. Most German "giants" had daring features.

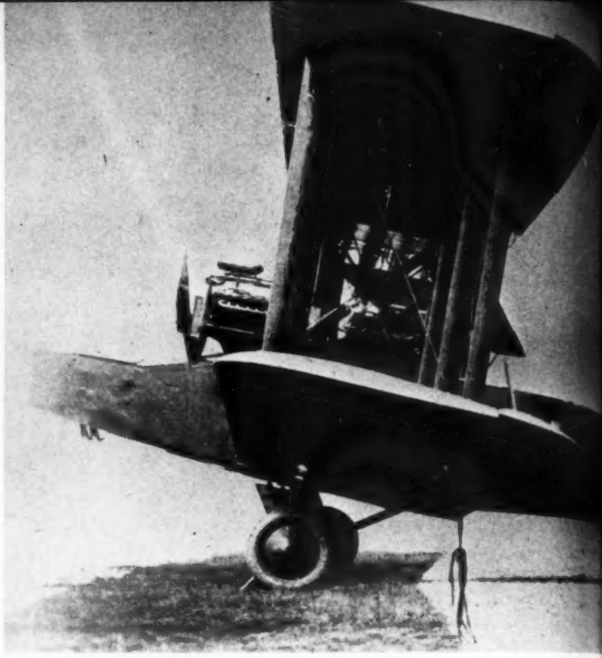


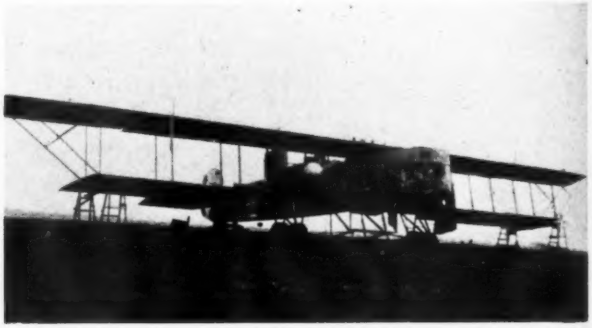


For climbing over the Alps to bomb Austria, Italy had tri-plane Capronis, three engines. Largest "giant" in quantity production.

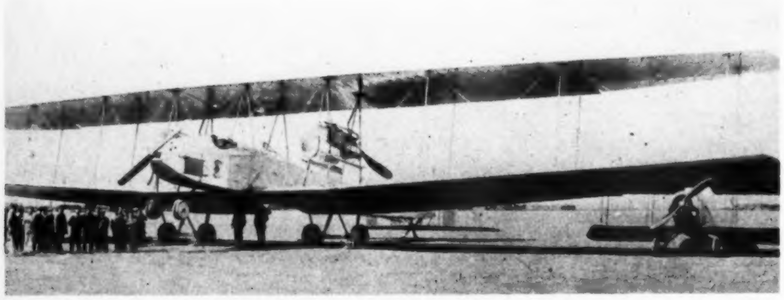
Right—Standing ready at War's end to bomb Berlin were four-engined Handley Page "heavy" bombers. It weighed 15 tons, did 105 mph.

Below—Dornier RS 1V was a tossed salad of engines, nacelle, fuselage, sponsons, and men. In rare old pic, a Dornier is airborne.



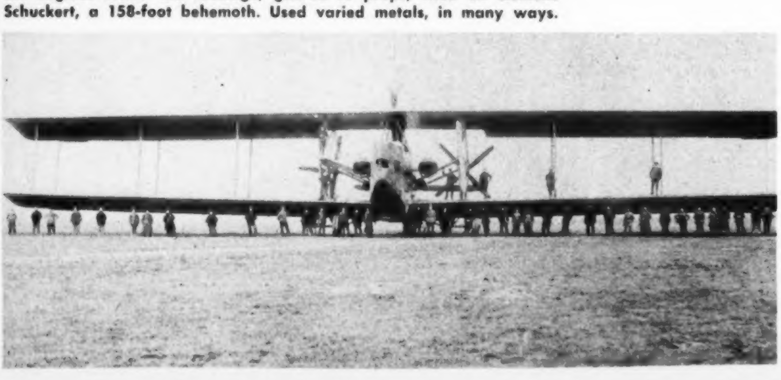


One of earliest and biggest of them all, was a Russian bipe Sikorsky. Cabin unique for the day.



From three to five engines featured the 1914 German VGO's. Firm achieved improved climb, altitude, through use of superchargers.

Six engines inside the fuselage, geared to props, tried on Siemens Schuckert, a 158-foot behemoth. Used varied metals, in many ways.



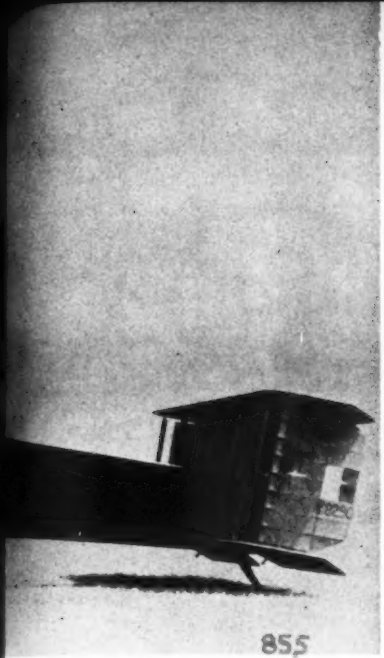
of very large types, both landplanes and flying boats. Italy, thanks to Caproni, produced what was the largest service type to be used in squadron quantities.

In this article, discussion has purposely been limited to aircraft with wingspans of more than 125 feet.

The Kennedy Biplane

One of the earliest airplanes to meet our wingspan requirement was produced by an Englishman named C. J. H. Kennedy. He was one of Russia's aviation pioneers who worked closely with Igor Sikorsky in the design and construction of several of the 1913-14 Sikorsky four-engined biplanes. Although the Sikorskys were of respectable size in their day, Kennedy believed that a really big airplane could be successfully built and flown.

Returning to England late in 1914, Kennedy designed a hugh biplane along very conventional lines. It had a wing span of 142 ft. and was 80 ft. long overall. These were unheard of dimensions. The fuselage was enclosed, with windows let into the sides its entire length. Power was supplied by four 200-



hp Salmson engines arranged in tractor and pusher pairs. The Kennedy was too heavy for the available power—it weighed 19,000 lbs. empty!—so it was flown only in a straight line for just a few feet. But it flew.

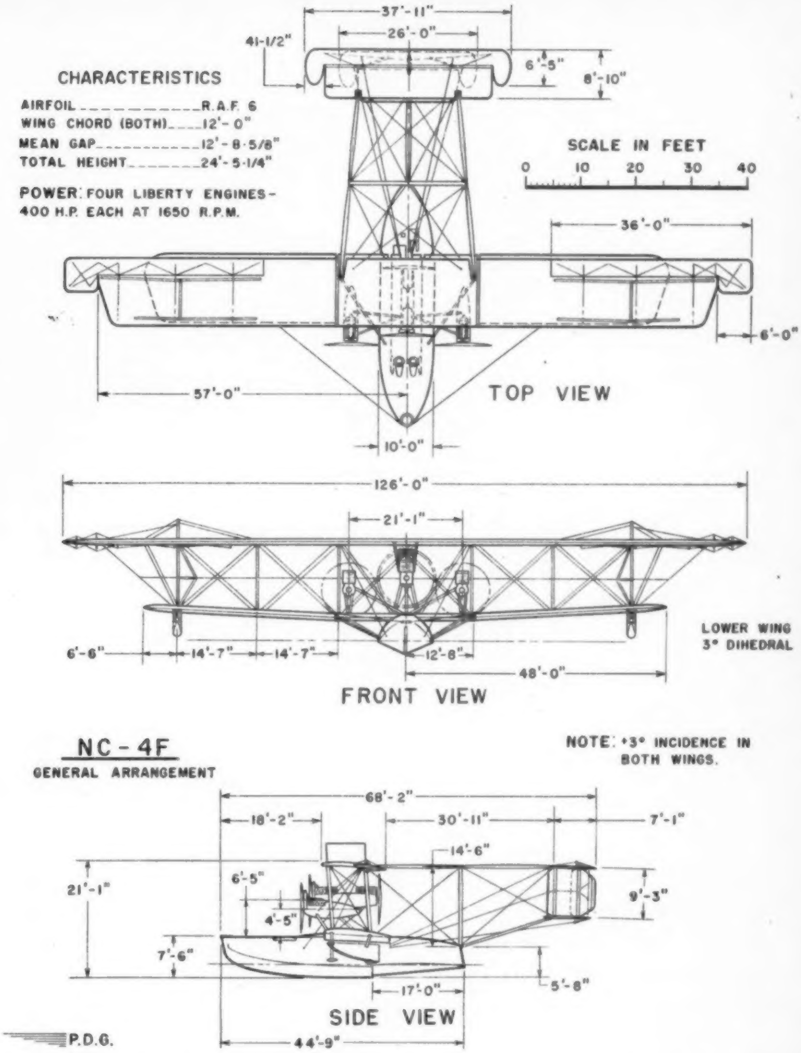
Handley Page V/1500

This was a more successful British bomber in the "giant" class. A biplane behemoth spanning 126 ft. and 62 ft. long, it was put in production in 1918. A number of V/1500s, attached to the Independent Air Force (a British strategic bombing group) was standing by with orders to bomb Berlin when the Armistice was announced. Thus was an historic action prevented from taking place!

The V/1500 had a gross weight of 30,000 lbs. and was powered by four 360-hp Rolls Royce Eagle VIII engines arranged in tractor and pusher pairs. Fuel capacity was 1,000 gals., enough for a 14 hour flight. Top speed fully loaded was 105 mph at sea level; it landed at 50 mph and climbed to 10,000 ft. in 21 minutes.

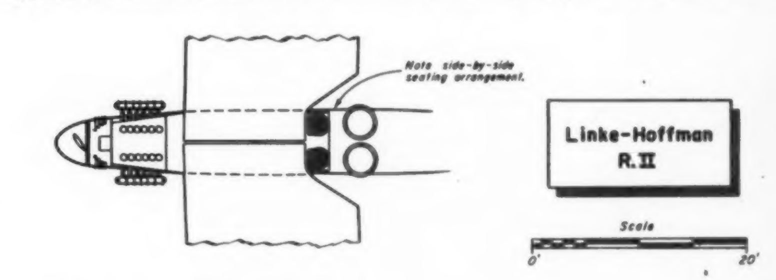
Tarrant Tabor

The Tabor was a triplane with a middle wing span of 131 ft. 3 in. and a top and bottom span of 98 ft. 5 in., and overall length of 73 ft. 2 in. Also an English design, it was powered by six 500-hp Napier Lion engines. This aerial monster was of all-wood construction, and many of its wood structural members were patterned after standard metal girders. Wing spars, longerons and fuselage formers were of typical open girder design. The fuselage was a beautifully streamlined monocoque affair located between the lower and middle wings. Four engines were arranged between the lower and middle wings in (*continued on page* 58)



American NC boats built for ocean try. The NC-4 hopped Atlantic from Newfoundland to the Azores.

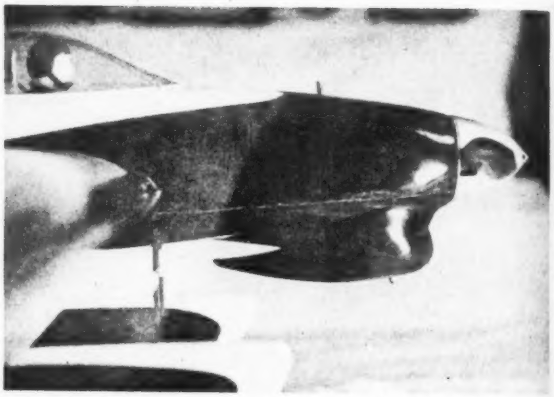
Buried engines, favorite scheme of the Germans, drove huge single prop on Linke-Hoffman R.11.



Man-sized airplane for a man-sized job, one of top competition airplanes in the east. Appearance eked out victory over tough foes.

MIRROR MEET STUNT WINNER

the Gambler



Inverted cylinder prettied up by this racy-looking helmet cowl, wheel pants. Sam, the pilot, says it also is a good ship to fly.

by FRANK McMILLAN

What about windy weather ships? Tanks? All the other thisa and thata? Here's a man who doesn't believe in trade secrets. Plans, directions, sure. Big bonus briefing also.

From spinnered nose to tail, Gambler is clean-cut aircraft. Nifty colors—and don't forget masking tape, decals, to suit your taste.

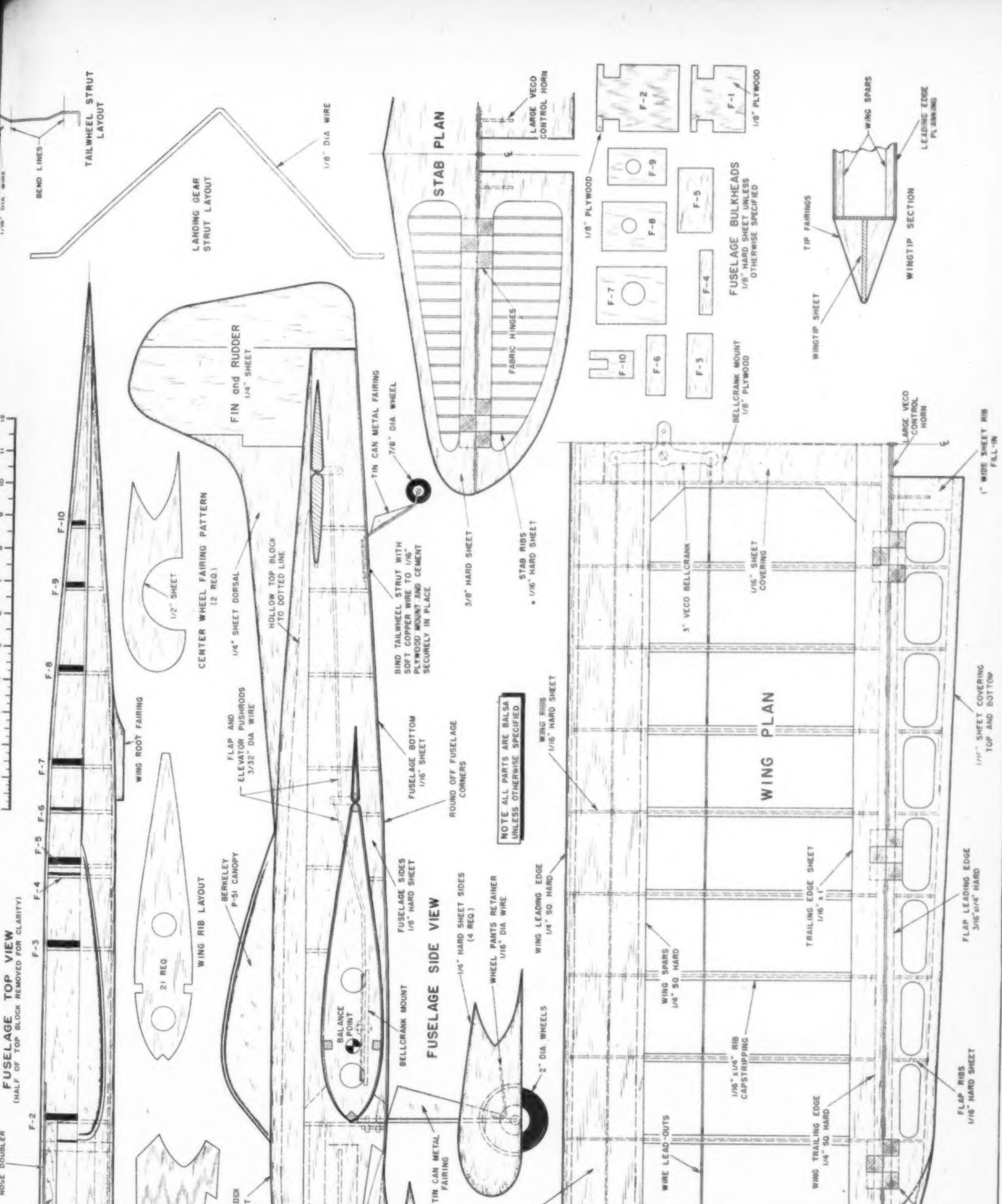
► One of the main requirements for top-notch stunt flying is a dependable, proven design. If you are just starting in to fly stunt, it would be advisable to stick to a good kit. There are three types of design: (1) the large, slow model which has a tendency to be rather heavy and, therefore, stally; (2) the medium sized model which, on the whole seems to be the best combination of size, weight, and speed for the beginner; (3) the small, fast model which is troublesome to fly.

Judging from the experience I gained during the past contest season, I would say that an all-weather design is almost an impossibility. The large model is a joy to fly on a calm day, but in windy weather the big plane becomes treacherous and extremely hard to fly smoothly. On the other hand, the small model has proved to be somewhat tricky in calm weather, but as the wind becomes stronger, the speed of the smaller model tends to have the affect of making the plane fly more smoothly. Therefore, I would suggest to those of you who want to be well prepared for the coming season that you build two models of similar design, one being approximately two thirds the size of the other.

The reason for the similarity of design is that once you are familiar with the flying characteristics of one model you will also be familiar with the other. It will then be possible for you to switch models according to weather conditions.

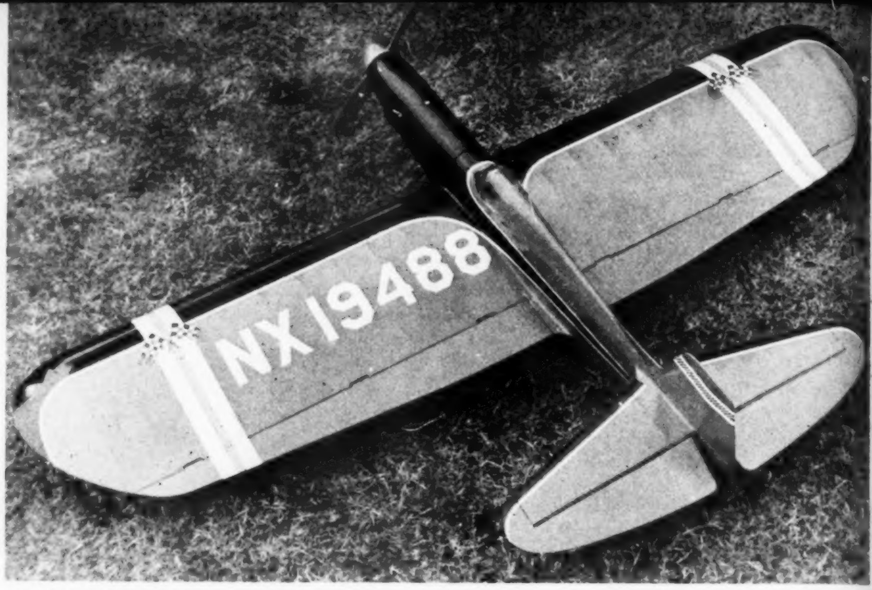
In regard to selecting a kit model, I recommend any of the larger designs. I happen to fly the VECO Chief. In nine contests entered this year, the Chief has brought home a total of eight places—four firsts, and two thirds in stunt, and a second in none-scale beauty.

The average kit is a well-engineered design but, since nothing is perfect, there are always a few changes that can be made. However, do (*Continued on page 40*)



FULL SIZE PLANS AVAILABLE. SEE PAGE 46.

Pointers On Stunt



by W. F. NETZEBAND, JR.

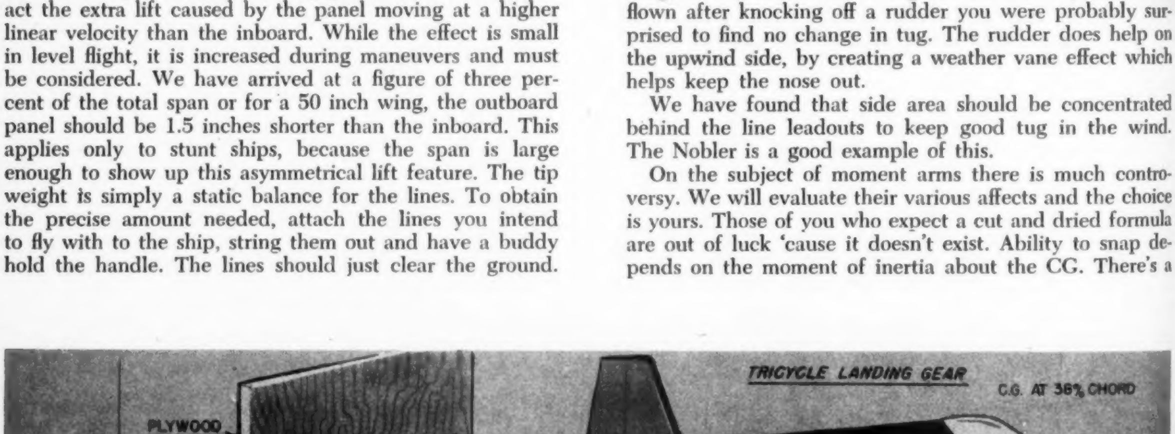
This is the fifth and last of a series of articles covering the whole field of stunt model design. Proportions, areas, what to do, not to do, summed up in plain English.

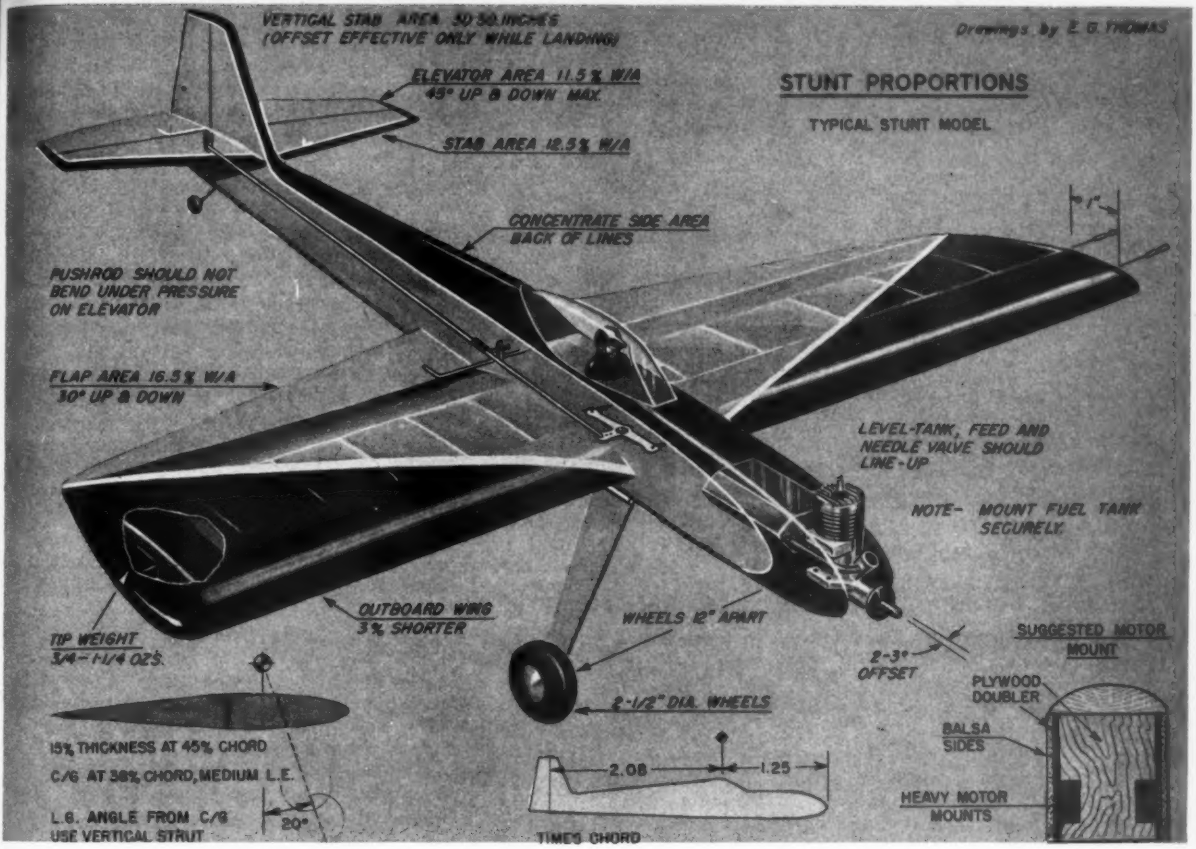
► Shortening the outboard wing panel serves to counteract the extra lift caused by the panel moving at a higher linear velocity than the inboard. While the effect is small in level flight, it is increased during maneuvers and must be considered. We have arrived at a figure of three percent of the total span or for a 50 inch wing, the outboard panel should be 1.5 inches shorter than the inboard. This applies only to stunt ships, because the span is large enough to show up this asymmetrical lift feature. The tip weight is simply a static balance for the lines. To obtain the precise amount needed, attach the lines you intend to fly with to the ship, string them out and have a buddy hold the handle. The lines should just clear the ground. Add enough weight on the outboard tip so that the wings are level while the ship is supported by the fuselage and viewed from the front. As you can see, the minimum weight depends on a number of variables, so no precise figures can be given.

Last but not least, rudder offset helps only when landing, surprisingly enough. In full flight the offset reduces drag, but does not effect tug too much. If you've ever flown after knocking off a rudder you were probably surprised to find no change in tug. The rudder does help on the upwind side, by creating a weather vane effect which helps keep the nose out.

We have found that side area should be concentrated behind the line leadouts to keep good tug in the wind. The Nobler is a good example of this.

On the subject of moment arms there is much controversy. We will evaluate their various affects and the choice is yours. Those of you who expect a cut and dried formula are out of luck 'cause it doesn't exist. Ability to snap depends on the moment of inertia about the CG. There's a





formula for it in your physics books, but our system is complicated somewhat by nonuniformity of weight distribution forcing us to fall back on generalities and cut and try methods. The engine is the largest concentrated weight and it follows that the closer it is to the CG, the quicker our ship will react, all else remaining constant. Unfortunately, all else does not remain constant. A short nose and a long tail moment generally leads to a tail-heavy ship with lead in the nose. If we take two elevators of equal area and motion, one on a long moment arm and one short, the longer will generate more controlling force on the wing, as proved in our earlier discussion. In the practical sense we shorten the tail moment arm proportional to the nose moment and increase the elevator area. Examples are the instantaneous reaction of the all wing models. In stunt, however, the ability to pop around corners is overshadowed by the necessity for smoothness. So we use a long nose and fairly long tail.

When transferring dimensions from one size ship to another it seems realistic to base dimensions on the wing chord rather than the span, for our purposes at least. Normally, the span is jockeyed to obtain the proper area, while our chord affects Reynolds Number, or efficiency, hence controlling our basic assumptions.

A few words about the fuselage are appropriate here since we must have one to hold the wing and tail as well as engine, landing gear and pilot. Area distribution is worth watching. Keep nose slim in side elevation and concentrate area aft of wing with fin area about 30 sq. in. for most large ships. Front end should be built rugged and stiff with rigid engine mounts. A light mount, as found on many profiles, vibrates badly giving poor engine run by causing inefficient engine operation and fuel foaming. Keep the rear end structure fairly light weight but don't sacrifice strength, since elevator loads get pretty high in stunt. Again rigidity is important. The slab-sided fuselage with planked or sheet-covered contours top and bottom is simplest and lightest to build and can be doodled into interesting shapes. This phase has been covered several times in the past so we'll drop it on its head.

We've touched on the vertical CG location and its affect on flight. Suppose we look at other phases of location of parts in the shear view of the plane. Drag can be considered concentrated at a point just as lift, weight and thrust. It can be estimated by considering the landing gear drag about 25% of the total, the wing about 40% and the fuse and tail as the other 35% (*Continued on page* 60)


Bob Durey, with Ed D'Nicola's Fox .35 Half Fast, at Mirror. Author's design.

The sleek record-holding sailplane, the Mark 2, was the result of much bitter experience.

The Long Project

by FRANK BETHWAITE

Conclusion of an extraordinary story is longest article ever printed in MAN. Skip the RC portion, if you will, but do not fail to read this report on flight experiments.

(PART 2)

(EDITOR'S NOTE—*Last month, the author had given the development of his powered model and had introduced co-experimenter, Don Wilson.*)

► The first record attempt, in February 1954, failed due to forecast error. The model had to be landed after about an hour when a rising wind threatened to blow it away. This was the occasion when we found the Bonner-type gear clumsy and unhandy. It was replaced with our standard "quick-snap." For convenience two neutrals are arranged, one for straight flight and the other for a lazy circle for use in a calm. We now control the model most of the time by simply selecting neutrals; the turn positions are only for unexpected corrections or for take-off and approach.

A dawn attempt was made in March 1954 from a frosty inland grass airfield, which I judged the safest locale to use should the model go astray. A narrow black-top taxiway, flanked by high grass, was the only available hard smooth surface, and is brutally difficult to take off from. The attempt failed: first, because at the freezing temperature, fuel viscosity was such that fuel would not pass through the main-to-header tank filter, and this took time to discover; secondly, because a light cross-wind sprang up later which defeated all further attempts at take-off from that narrow taxiway.

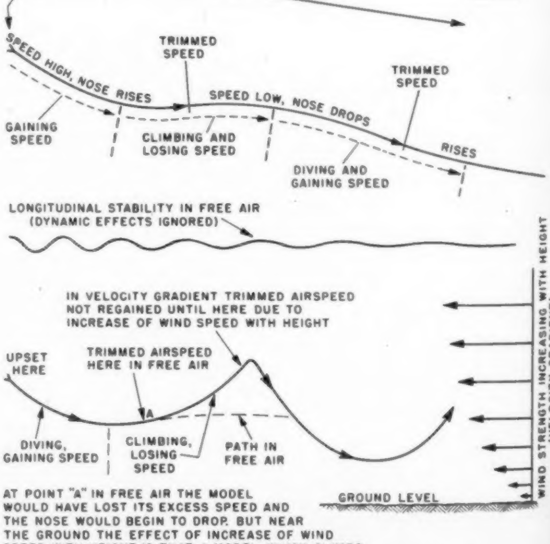
A further attempt in May flew perfectly for an hour and a half and then gently ran out of altitude with the motor still going apparently perfectly. The model was retrimmed and a second flight started, only to do the same thing. This really had us baffled.

Disgusted beyond measure with the model and with all models generally, I pitched the glider into a suitable wind clear off the brink of a sheer coastal cliff a few days later. This was something that had intrigued me but until then I had thought too much of my models to dare try it. Result—two hours of gloriously exhilarating and certain flight before running out of daylight, and another World record!

The sinking of the power model was diagnosed as due to the twisting of the silked wings under the continuous torsion load. Twisting tests proved silked wings to yield considerably on initial loading and to yield further with time, apparently without limit, while papered wings yielded relatively little initially and no further thereafter. Silk was stripped and paper substituted.

My personal affairs prevented any further attempt until January, '55. A dawn attempt failed again for an unusual reason. The model rolled fast over a large sharp stone and cut its lower covering open, and immediately thereafter the take-off fetched up with the model going through a dust puddle. The state of the relaytors was such that a major cleaning was imperative. The cleaned and repaired model was flown late the same afternoon for 3 hours and 2 minutes, and landed under power at last light. This flight, another World record, (recently exceeded by Mr. Velichkovski with 3 hr 6 mins.) proved to us that elevator trim

FIG. 5



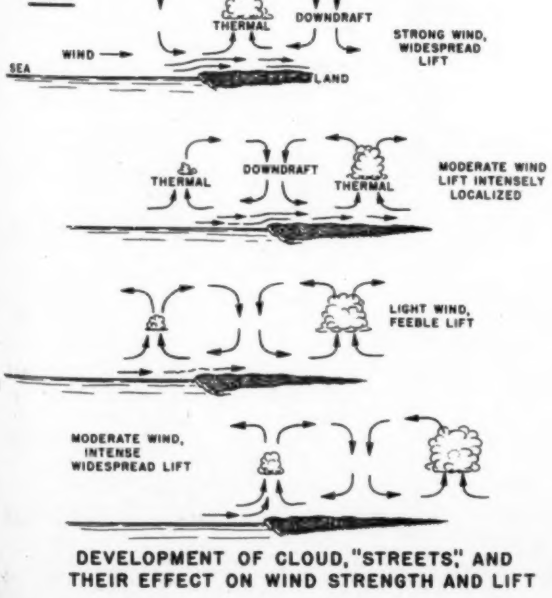
control is not really a satisfactory altitude control for a constant-power model which almost halves its weight during flight. Trim changes and speed changes are too much for simple easy-to-handle flight, the large, lightly built model does not run true when shallow-diving at speed, and this particular flight was, in fact, difficult to bring down.

As all attempts from that inland airfield had been compromised by take-off difficulties, I decided that in future I would use the local airport with its acres of smooth concrete, despite the danger that, surrounded on three sides by water any control misbehavior would mean loss of the model. An attempt in March '55 failed at two hours when the motor leaned out and cut during a dive to lose altitude. I do not blame the motor for that cut: it was set too lean from the start, and the dive was too severe. But somewhere the whole motor-model combination was too critical. We were getting too many failures at 1½ to 2 hours, and it seemed to me that most of the failures were due primarily to the speed changes unavoidable with trim and weight change. In an endeavor to limit the speed range, I removed elevator trim control and fitted spoilers. Power required to operate these spoilers is considerable. But they do give the most positive control over altitude while retaining the true-running handling associated with moderate speed. Another attempt was made in February '56. It failed at 1½ hours due to failing power. On this occasion there is no doubt that the motor was responsible. It carboned up. In retrospect this may have been the real reason for the failure previously thought due to twisting wings.

That completes the story of the power model up to the moment. Recent tests with various fuel brews, including a particularly potent and supposedly clean-burning broth supplied by the engine manufacturers, leave me convinced that the small diesel, no matter how perfectly made, is as yet too critical in its operating settings to be a realistic power unit in a model capable of carrying 14 hours fuel, 24 hours of relaytor power, and 60 hours of radio power. This combination has been flying since early '54, and we have yet to get 25% of its potential duration out of it.

Returning now to the glider, there were lessons to be learned from the two-hour flight. It was sheer exhilarating

FIG. 3



DEVELOPMENT OF CLOUD, "STREETS," AND THEIR EFFECT ON WIND STRENGTH AND LIFT

Power model, Mark 2, did more with less power than any model so far.

fun to be flying a model from the edge of a cliff, in better lift than ever before, the model hundreds of feet up among the gulls and over the sparkling sea far below. But the practical lesson was observation that while general wind strength, as indicated by appearance of the rough water a way off shore, remained constant, lift and wind strength over the cliff edge were far from constant. When launched, the model flew very high and barely held its own in speed. Half an hour later it was low, as were all the gulls; the little lift available was restricted to the locus exactly above the cliff-edge, and model and gulls were beating up and down flying accurately in this narrow zone. Gradually, wind speed increased and the model rose higher and higher again, until at the hour mark it was again very high and just holding its own. This sequence repeated twice exactly in the two hours, and I could not help recalling my original one-hour record, and the unsuccessful later attempts which blew back at 51 and 63 minutes. It can be stated here that a broadly similar sequence has been observed in all subsequent cliff flights.

I now believe that this surge and fade is due to the wave-like manner in which cloud streets generate and break away along a coastline when an unstable onshore wind is blowing (See Fig. 3). Associated with each street is strong lift under the cloud, and marked subsidence in the clear air between the streets. Estimates of wind speed and lift based on the average wind are not valid. At times the wind over the crest will be much stronger than the steady wind, while at other times the lift available will be much less than would normally be expected. It was evident that nothing more could be expected of the single-speed glider with its moderate performance, and so Mark I was given away. It had served me well and is flying still.

Mark 2 was a two-control glider of the same size as Mk I. It had more slender lines and thinner (10%) slightly undercambered wings; weight was reduced to 47 ozs, compared with Mk I's 54. Performance increase was such that, whereas Mk I had flown amongst the gulls, model and gulls gliding together, Mk 2 and subsequent models have soared high above them, often hundreds of feet higher. Radio gear is quick-snap 2-control, the second relaytor operating the elevator setting such that "up" is normal low-speed glide (designed to be about 31 ft. per sec.) and "down" is an arbitrary setting determined by experiment at which the model is traveling as fast as we dared drive it. There is no neutral setting.

(Continued on next two pages)

The Long Project—*continued*

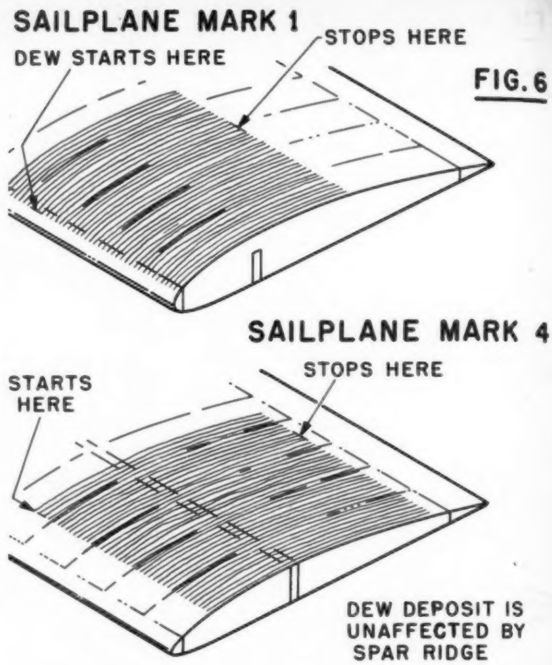
An important change was made in the electrics. Previously, Venner accumulators had been used for filament supply. This meant that no flight was possible unless the accumulator had previously been charged overnight, and several good days had been lost because this had not been done for one reason or another. From Mk 2 onwards Kalium cells have been used. A 3-ounce pack yields from 33 to 60 odd hours supply, depending upon the valves fitted, and is, of course, instantly available at any time. Radio stability and battery life with Kaliums may be judged from the following: The morning following the NZ Nationals in January '55, Les Wright attempted the duration record with a power model, a single-control floater. It blew downwind after half an hour or so, and was spun down half a mile downwind. Search was unsuccessful, and the model was abandoned. On passing through the area two days later, a further search located the model high in a tree. The radio gear was found to be operating normally after recovery, 52 hours after take-off. Theoretical endurance to drop-out voltage was in that case about 65 hours (DL91 and DL96 fitted.)

Mark 2 was a glorious model. In the course of a year's flying we logged over 30 hour's flying with it, all on the same batteries. Its most notable performance was to fly 3 hr. 24 mins. on one day, and 3 hr. 28 mins. the next, 17th April '55, which I claimed as a new RC glider record.

But it had its faults. Its performance was that of a thoroughbred but, trim it as I would, it remained a beast to handle. In particular, the elevator trim setting was super-critical, and in any case it would not run true at high speed, which was probably about 35 mph. (Low speed about 20 mph.) After an hour or two on a cliff in a strong wind its handling was so demanding that the operators developed such acute nervous tension that they began to make silly mistakes. It is entirely characteristic that both long flights mentioned above were terminated by control mistakes which in one case lost the lift, and in the other broke the model up in the air.

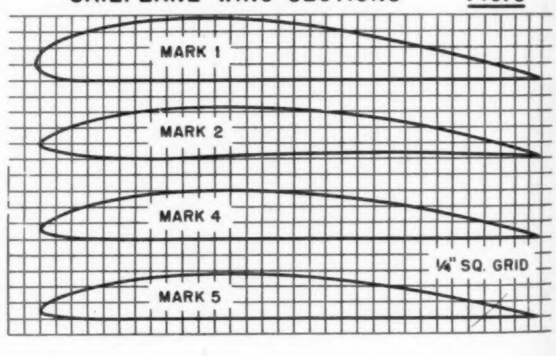
Two properties showed up in the flight of Mk 2 which had never been experienced before, but which have been common to Mks 3, 4, and 5. First, the abrupt discovery that a heavy, thin glider has so little drag that, given "down" elevator it can accelerate virtually without limit in a dive or spiral, and that, at some speed, thin high-aspect ratio wings, no matter how stiffly contrived in torsion, will flutter with a roar, and the model will disintegrate about two seconds after that, shedding wings and tail all over the sky. On the two occasions this happened to me fortune smiled. The first time the tail came off and the model tumbled end over end thereafter, with the wings sprung to about 20 degrees of negative dihedral. The second time one wing remained attached, and slowed the fall with its fluttering; the model actually fell on the nearly vertical face of the cliff, and slid for several yards. Dangling 50 feet down a 160-foot cliff on the end of a borrowed anchor rope of dubious strength was a new experience to my modeling, but we got the model back. We now accept that there is a definite speed, quite easily attainable, at or above which the glider must never be driven, and we handle it accordingly. We never try to spiral a glider down. To get it down, fly it out of the lift and wait.

The second new property to be discovered is that the same lack of drag results in the model becoming unstable into wind near the ground, due to the velocity gradient, the increase of wind speed with height caused by ground friction. A model is a single speed device at a particular trim. If its airspeed is above the trimmed speed the nose



THE INFERENCE OF THESE OBSERVED DEPOSITS IS TURBULENT FLOW AT ENTRY, THEN LAMINAR FLOW UNTIL, NEAR THE TRAILING EDGE, TURBULENCE AGAIN OCCURS.

SAILPLANE WING SECTIONS FIG. 8



will swing up, and vice versa. The action of a model in free air and in a velocity gradient is sketched (See Fig. 5). The important fact about this form of instability is that it is a function of lack of drag alone. It cannot be cured by a larger stab or a more forward CG position, nor will a faster trim fix it. There would be a theoretical velocity gradient which would just destabilize any model but, as the gradient is, in fact, everywhere nearly constant, in practice only models with less than the critical drag will get into real trouble, and then only when held straight into the wind and given a slight initial upset. But under these conditions, which are typical of an RC model on final approach, the initial upset quickly builds up into a most impressive plunging, and the only cure we have found is to turn the model quickly crosswind, steady it, and try again into wind if height permits. Fortunately, these gliders slide smoothly when landed across or even down a strong wind, provided only that the wings are levelled before they hit.

The rudder relaytor was driven by 100 ins. of ¼ by 1/24 rubber, wound to 3,000 turns (50% of breaking turns).

FIG. 1

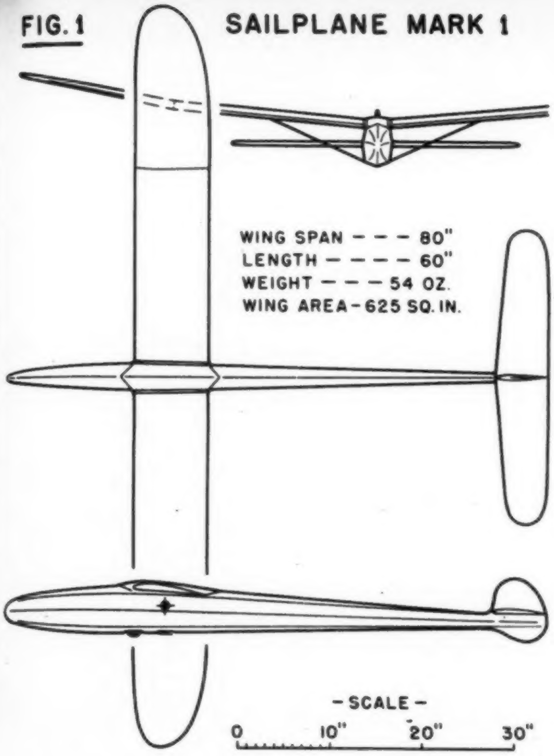
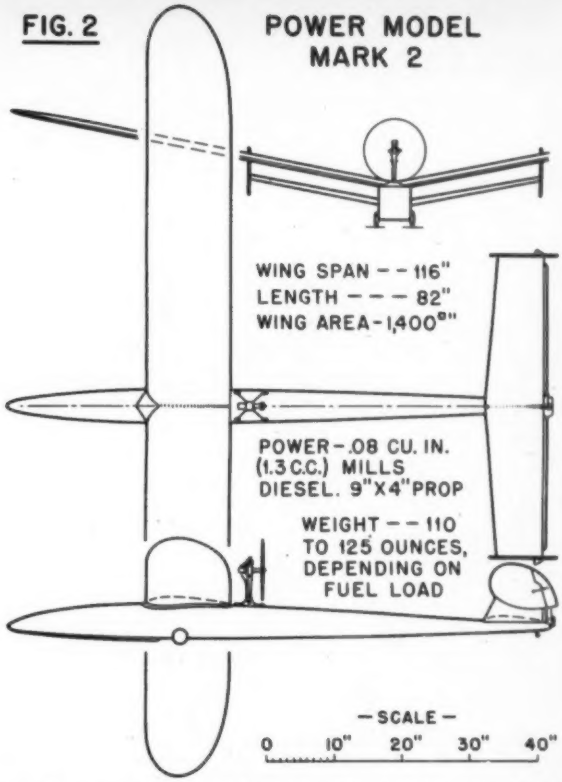


FIG. 2



While this number of turns was enough for almost any flight, we found ourselves constantly worrying over use of turns and debating whether a necessary correction of position justified "waste" of a turn.

Mark 2 then was a model which had all performance necessary, but which was super-critical to trim, and was on occasion so tricky to handle that with the added worry over use of turns about three hours of it seemed about as much as any team could stand without doing something stupid. We flew it constantly off a 700-foot towline for fun, and several times for record. I forget the sad story of each attempt except that they were all essentially terminated by mistakes—the radio never failed and the model never ran out of performance except that on occasion it was not correctly trimmed before flight, and that is really a mistake too. (*Continued on page* 54)

FIG. 7

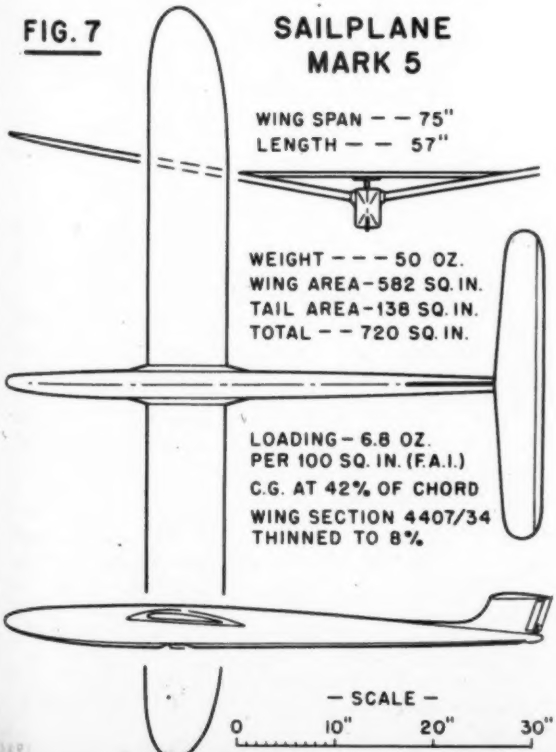
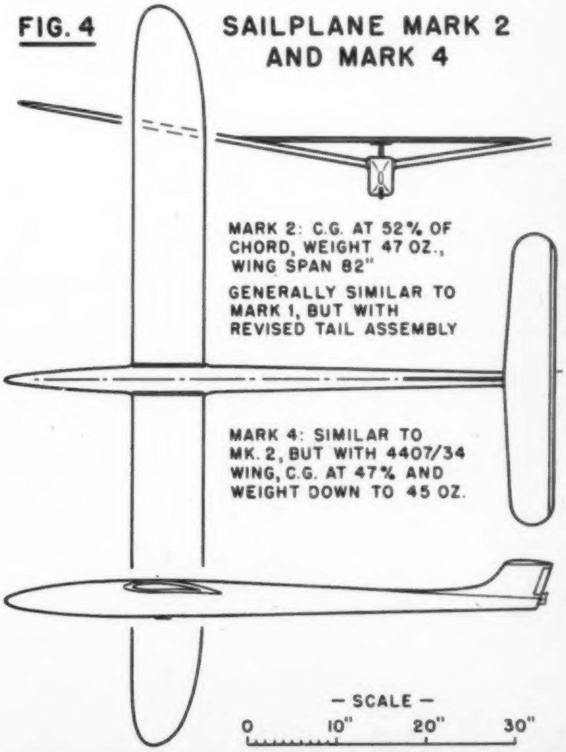
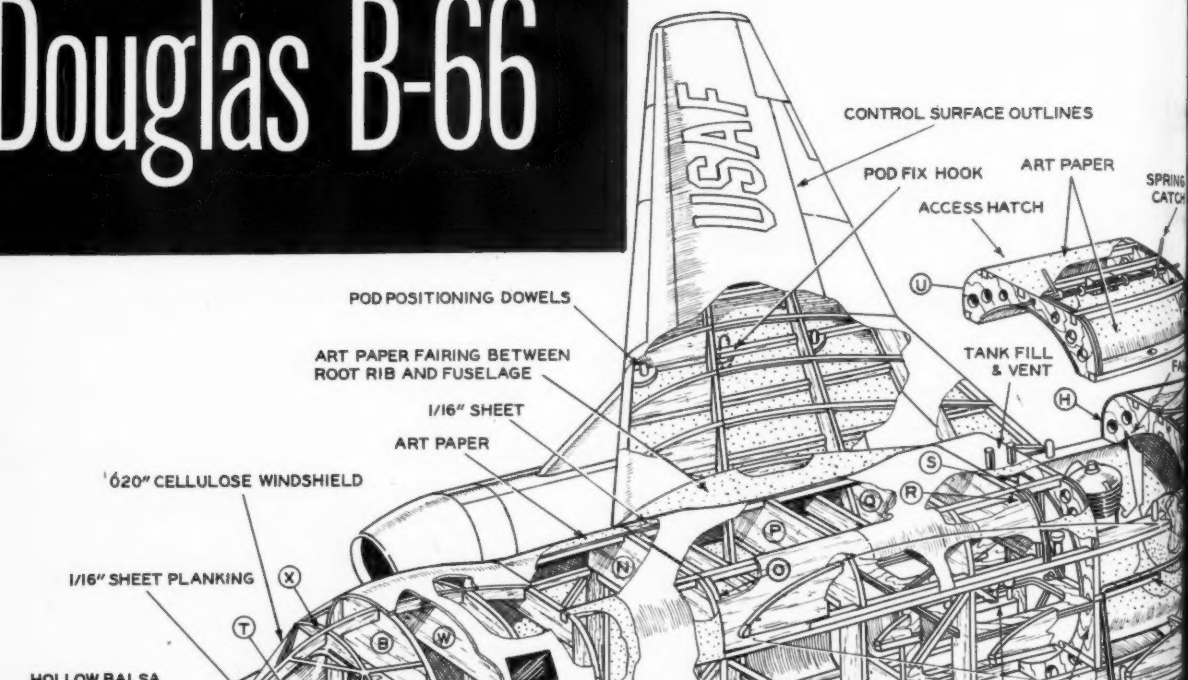


FIG. 4

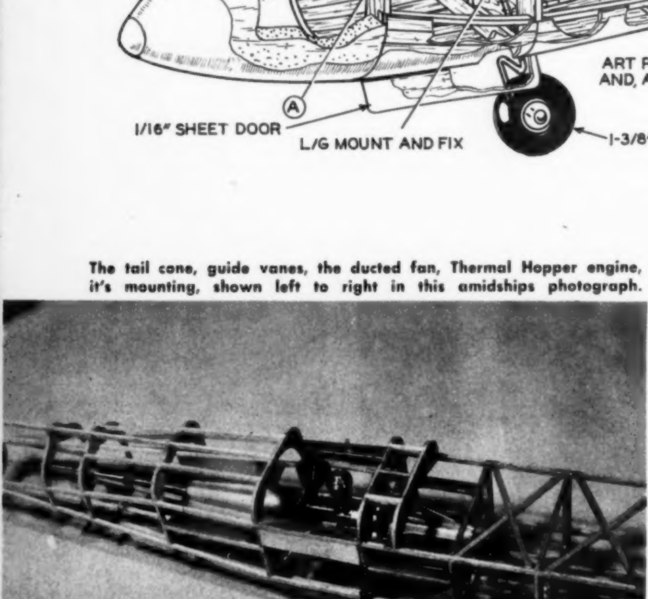


A DUCTED FAN
Douglas B-66

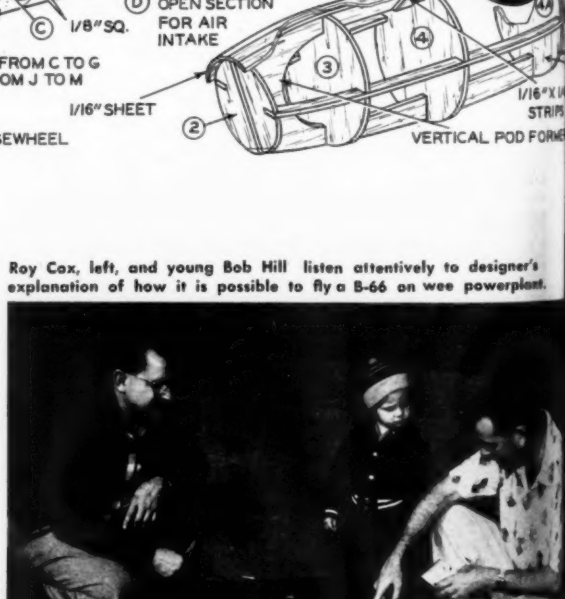
by WILLIAM H. PAXTON, JR.

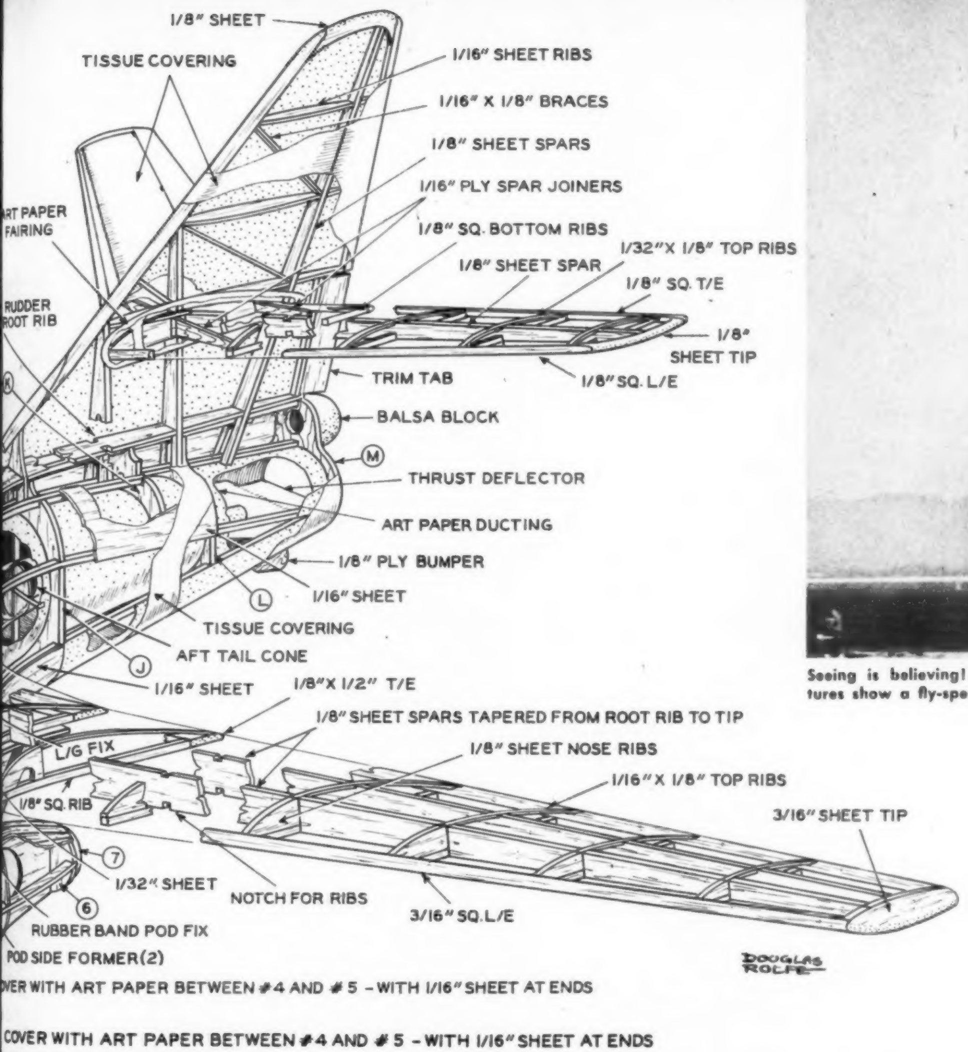


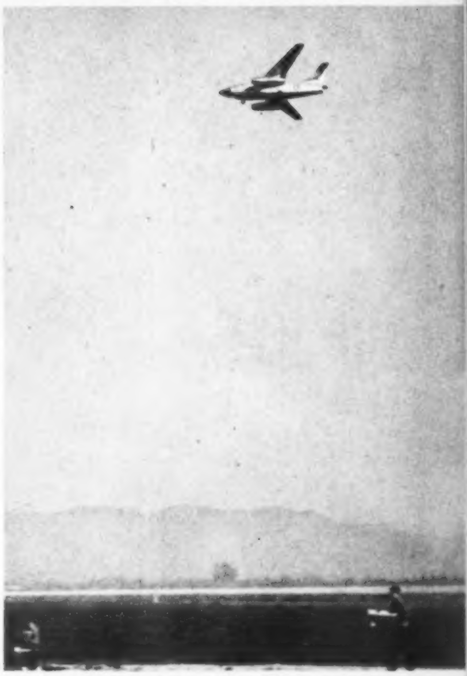
The tail cone, guide vanes, the ducted fan, Thermal Hopper engine, it's mounting, shown left to right in this amidships photograph.



Roy Cox, left, and young Bob Hill listen attentively to designer's explanation of how it is possible to fly a B-66 on wee powerplant.







Seeing is believing! It climbs higher but pictures show a fly-speck. How real can you get?

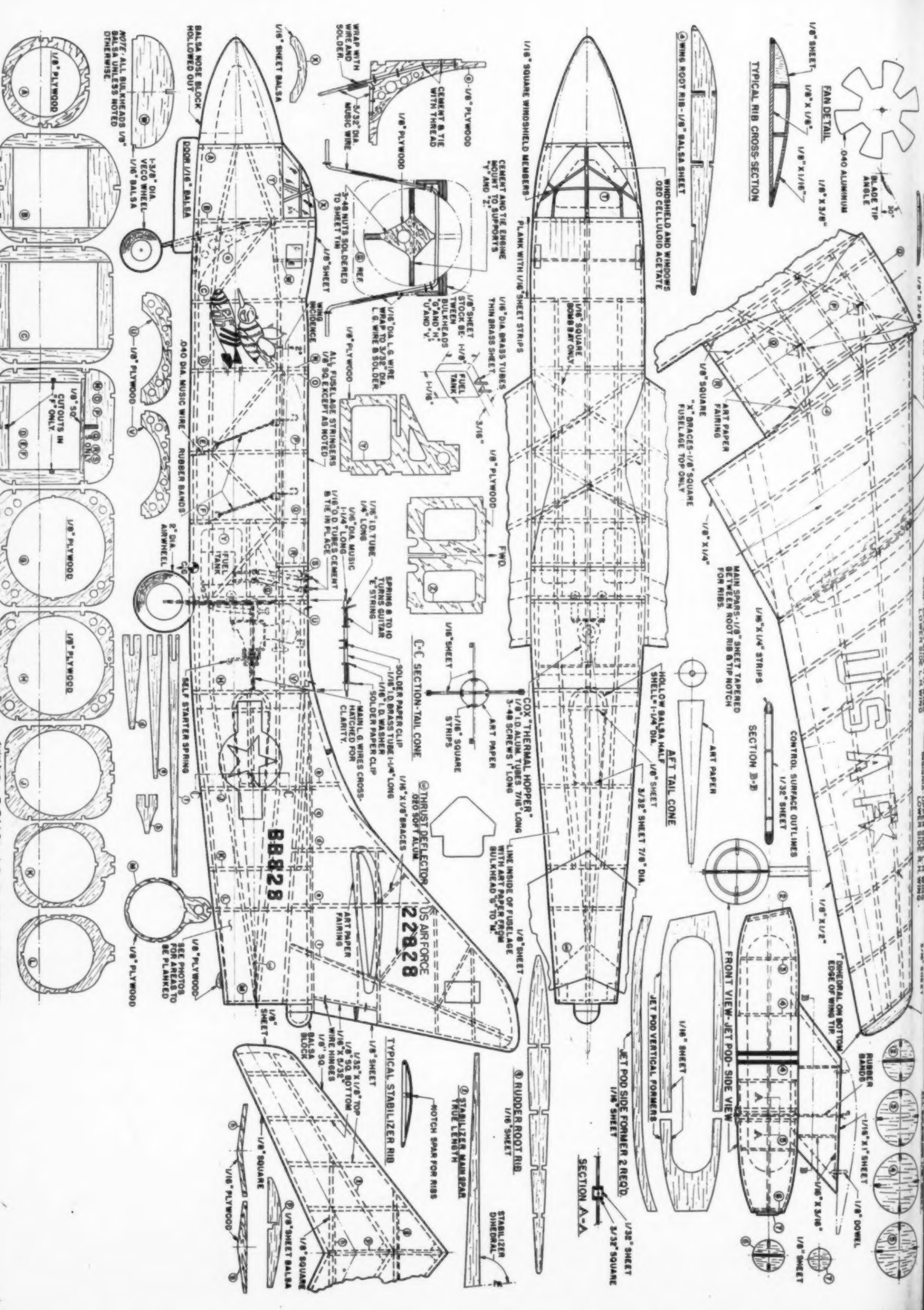
Craft assembles like the real one. Here, dummy, starboard nacelle slips into position on the wing. Note rubber hooks at wing center.

An adventure in building and flying, for experienced modelers. It flies on .049, proving the age of miracles has not yet passed.

► One of the most versatile light bomber-type airplanes ever developed, the new U.S. Air Force B-66 is a twin-jet, swept wing aircraft in the 600-700 mile-an-hour class. Two RB-66s, the photo-reconnaisance version, flew from Tucson, Arizona to Eglin Field, Florida at an average ground speed of 700 mph. Powered by two Allison J-71 engines and operated by a crew of three, the B-66 is capable of carrying the "H" bomb at altitudes up to 45,000 feet deep into enemy territory for all-weather, around-the-clock bombing.

Having noticed that my ducted-fan Cougar would operate with no loss in performance with air supplied through an opening in the bottom of the fuselage, it was calculated that a model of the B-66 should operate satisfactorily by hiding the engine within the fuselage and supplying air to it through the bomb-bay opening. An adequate air exit for the duct could be obtained by simply leaving off the rear gun turret. By having the engine in the fuselage,

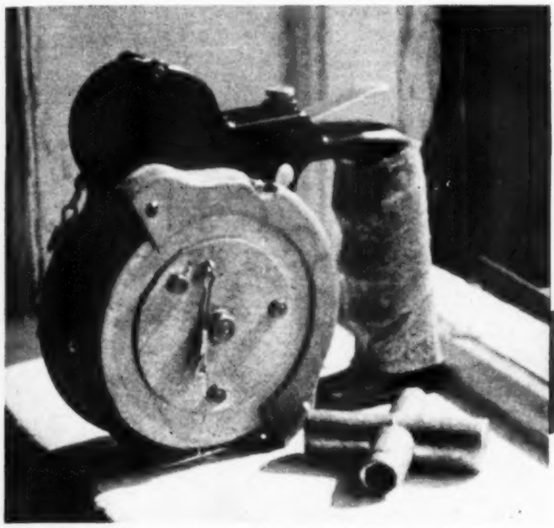
(Continued on page 46—Plan next page)



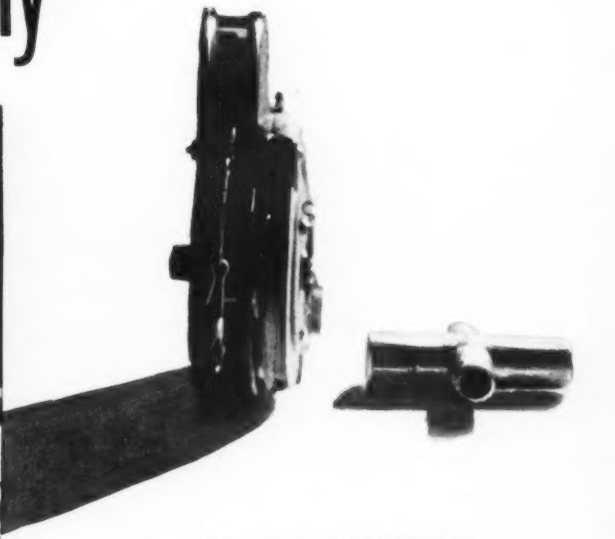
FULL SIZE PLANS AVAILABLE. SEE PAGE 46.

DOUGLAS B-66 BOMBER

Third-Line U-Reely



Plywood third-line unit attached. Optional two- or three-line use is provided by clutch, engaged by mounting screw. Use prop wrench.



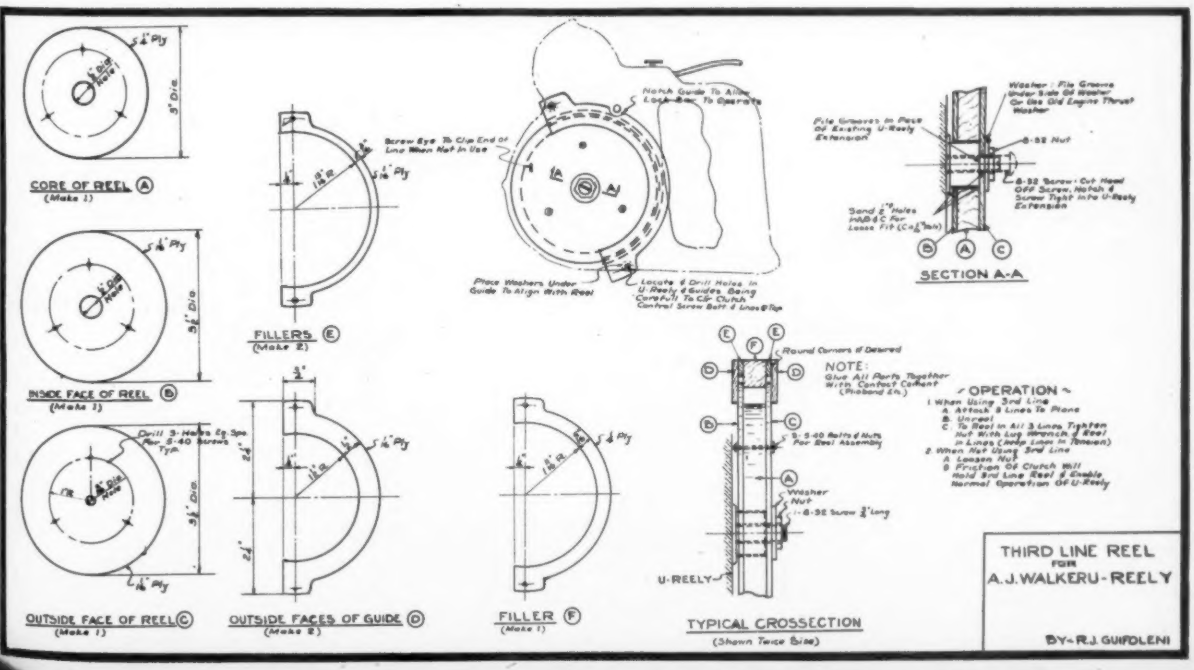
by R. J. GUIFOLENI

For the Navy Carrier Event and for sport—three lines often needed for motor, flaps, or gismos. So here's gimmick for a reel.

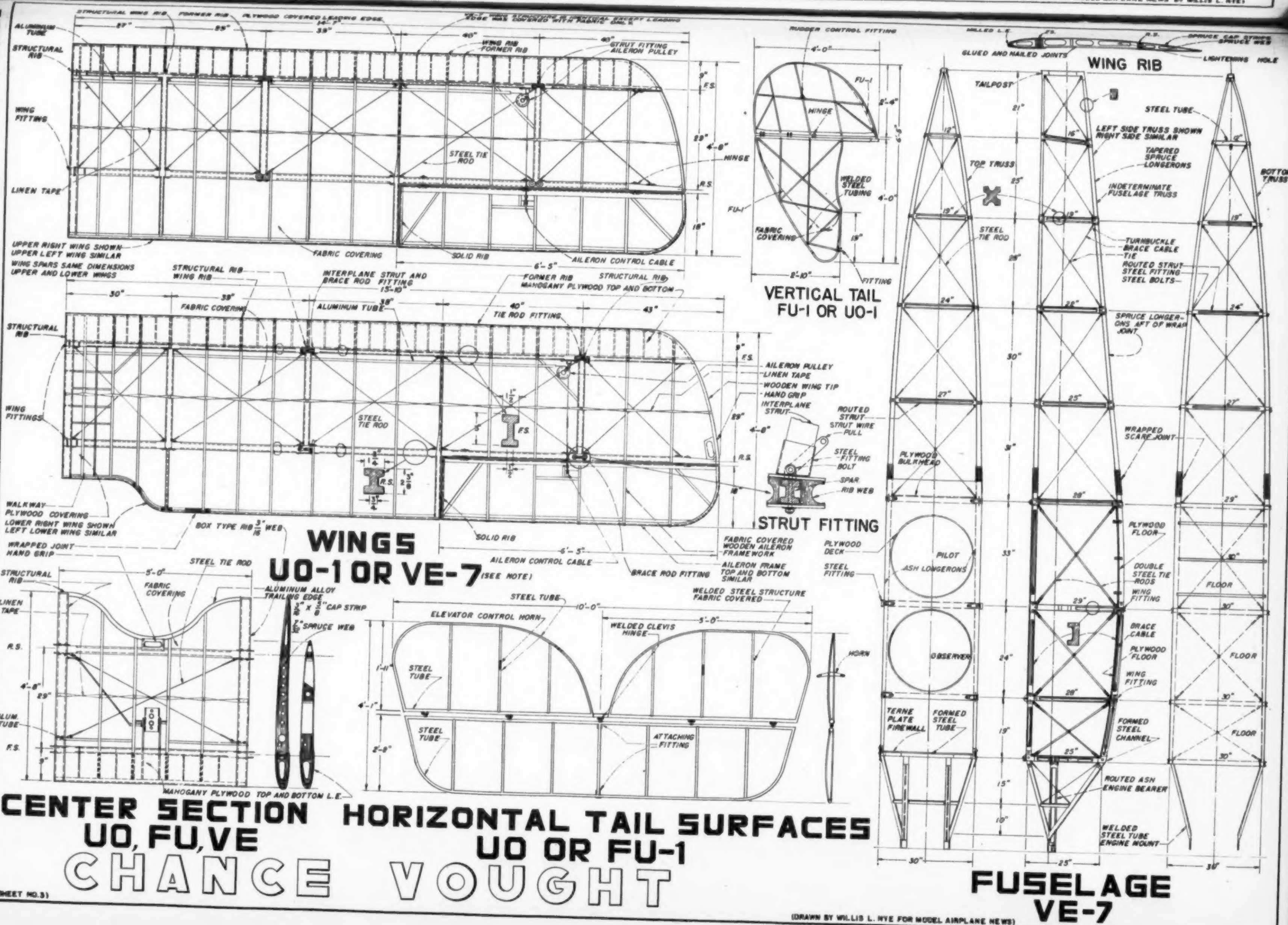
► Carrier event fans who desire a compact three-line reel, can easily convert their two-line American Junior U-Reely by following the details shown.

Basically, the conversion consists of an auxiliary clutch-controlled, plywood spool which is mounted on the body of the U-Reely. This unit enables carrier fliers to reel and unreel all three lines simultaneously; while permitting quick reversion to two-line operation with a twist of a lug wrench.

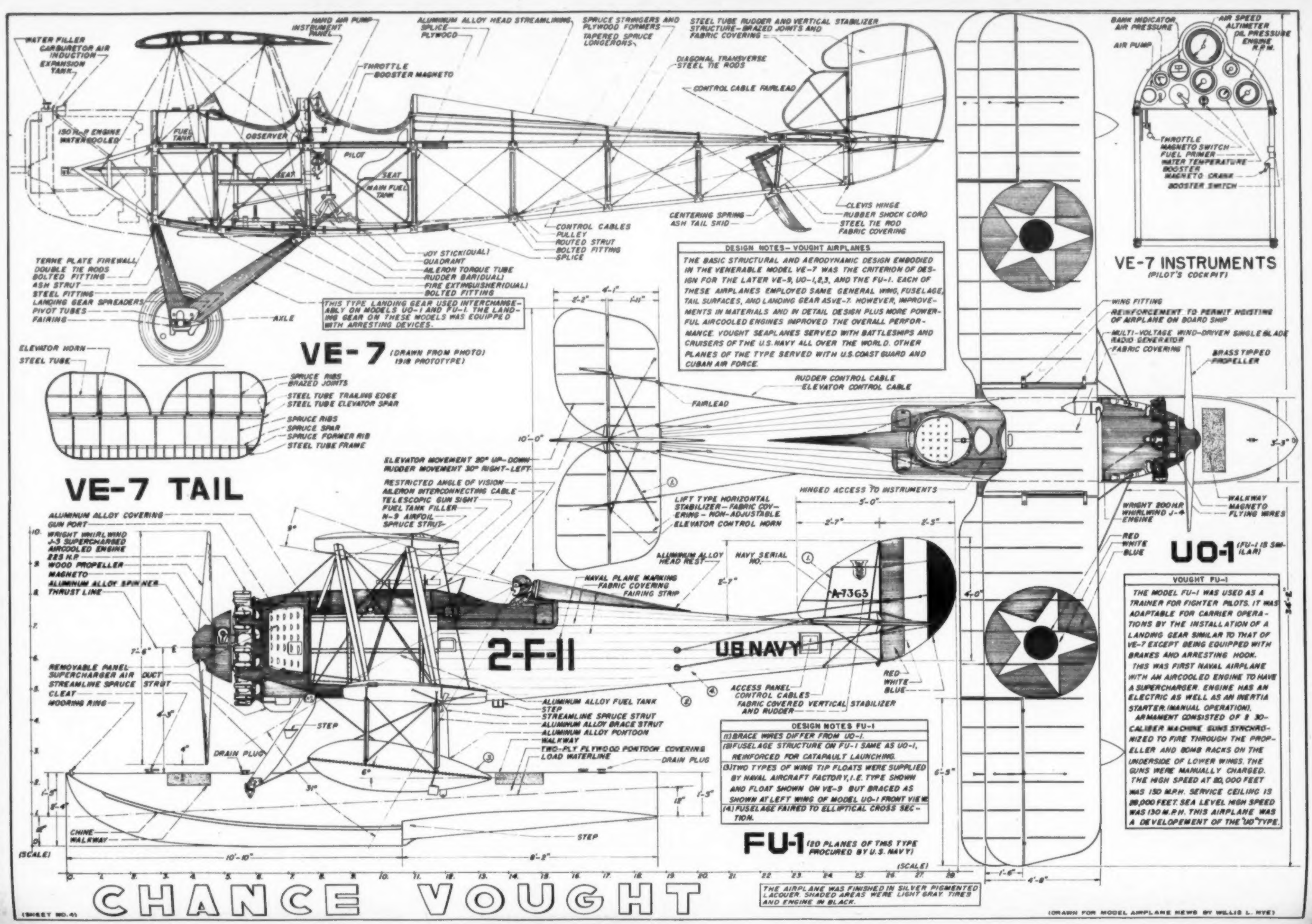
The uniqueness and simplicity of operation in changing from two- to three-reel operation, or vice versa, is entirely dependent upon the clutch arrangement. Tightening the mounting screw forces the auxiliary reel (plate C) against the U-Reely extension shaft. Thus, any motion of the standard reel is transmitted by the clutch arrangement to the auxiliary reel and simultaneous three-reel operation is obtained. To change to normal two-reel operation, the auxiliary reel is freed from the extension shaft by loosening the mounting screw. The small amount of friction provided by the side guides prevents any (*Continued on page* 52)



THESE TWO PLATES CONCLUDE



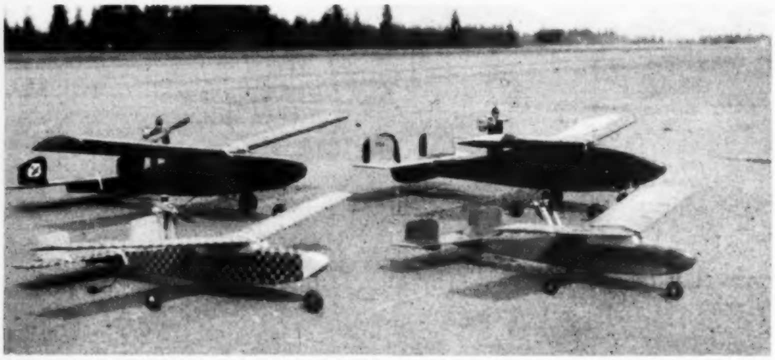
THE TWO-PART DESIGN STUDY.



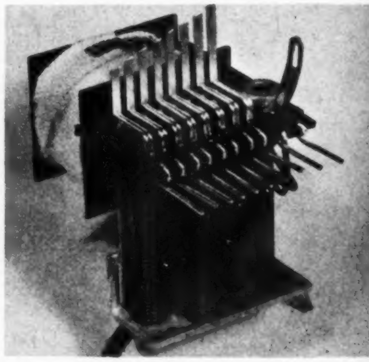
Breezy, from MAN, by S/Sgt. Paul Ahnert, Badaco radio, Babcock escapement for kick-up elevator. Weighs 35 oz., Cub .074 Diesel power. That's Mrs. Ahnert holding model for camera.

Radio Control News

By E. J. LORENZ



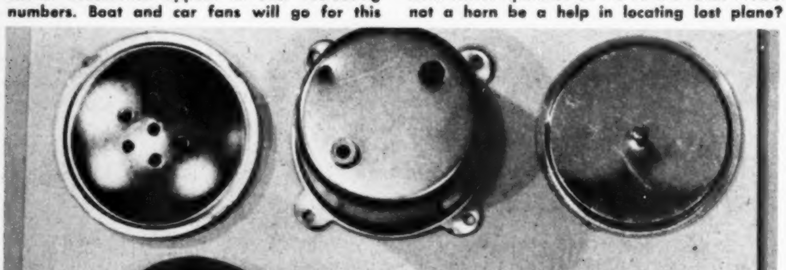
Descended from New Zealand and Australian designs are these engine-on-strut craft so popular in the Seattle area. New Zealand receiver —no relay required—is an imported item.



Ultra-sensitive 8-reed bank, Germany, weighs 1.65 oz. Reliable transmitters put over reeds.

The year 1957 promises exciting advances in RC art. More channels, greater reliability, small and light-weight equipment. And no end in sight.

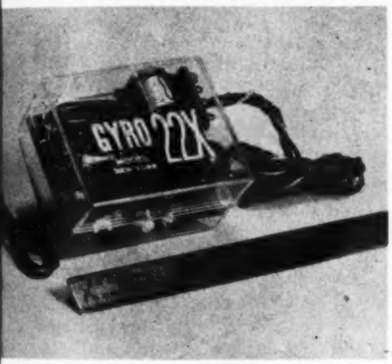
Clever accessories appear in ever increasing numbers. Boat and car fans will go for this horn which operates on 1½ to 4½ volts. Would not a horn be a help in locating lost plane?



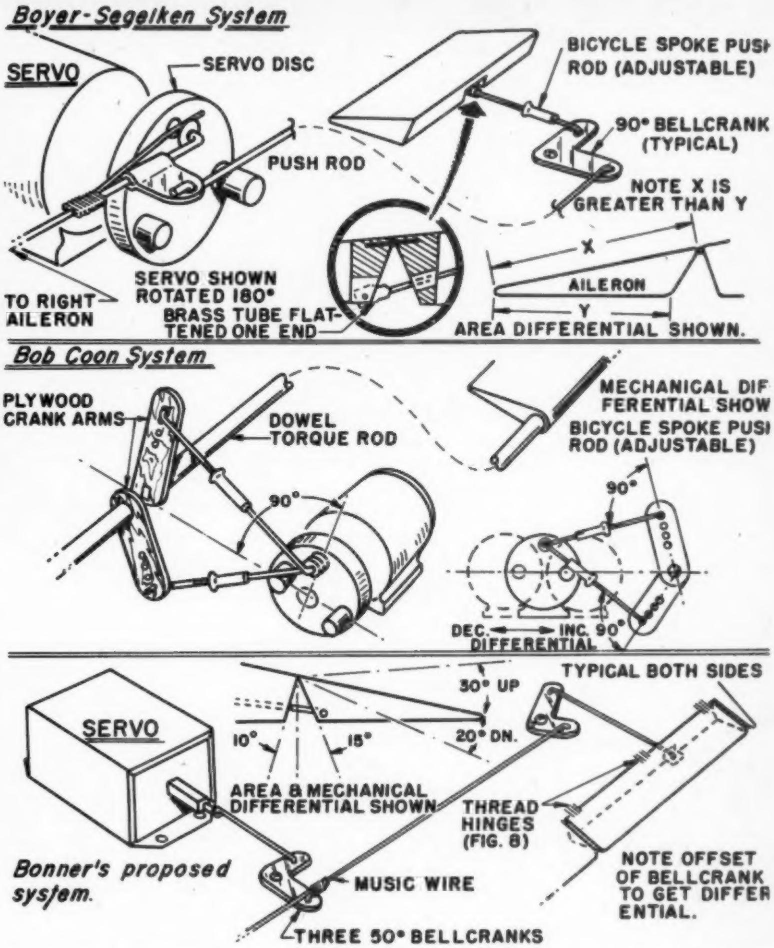
► From John H. Phelps, 1633 Pawnee Place, Owensboro, Ky., comes the idea shown in Figure 1. This is a method for eliminating the possibility of a knife-edge pivot relay to drift or wander, either in pull-in and drop-out, because of friction or dirt particles lodging along the pivot edge. Mr. Phelps has modified a Gem relay as shown and claims it to be "a miniature 4F." It should definitely improve performance, provided you do a clean job. A drill press is recommended for drilling the #66 hole and *all* excess flux used in soldering should be cleaned off. This may be done with a small brush dipped in carbon-tet (do not inhale carbon-tet).

There is talk about going to smaller multi-channel ships, provided the multi-channel equipment can be made small enough and light enough. So far, we haven't heard any size mentioned so we'll take a guess and say that something between 4 and 4½ foot would be about right. This is based on the fact that you would want the same degree of flyability in the small job as you are presently getting with 6- to 7-foot

At German Nationals, Stegmaier, his pneumatic control craft with twin-opposed Diesel engine.



New 2-tuber by Gyro weighs two ounces, uses two subminiature hard tubes. Has current rise.



Aileron-crazy. Coast came out with these workable schemes, thanks to 8-channel equipment.

planes. What about the equipment? Actually, there are a lot of old-time modelers in the RC field who believe that multi-channel might be getting out of hand. Eight-channel units are now available to the man with a fat pocketbook. This is no dig toward the designers and manufacturers of multi-channel equipment, rather a reminder that the beginner deserves attention. It is hoped that the beginner in RC will start with single channel and then work up through a multi-control system, from one channel, before going into anything more complex.

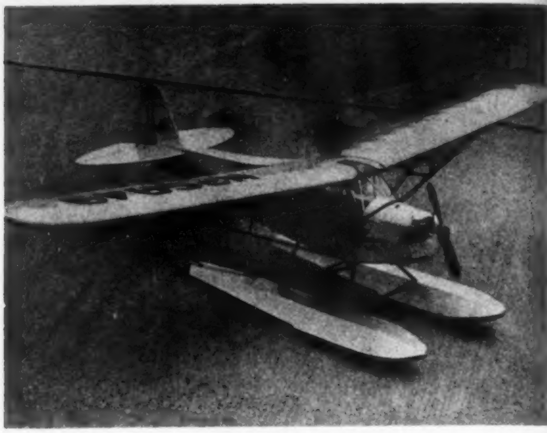
One other item which is often overlooked is the availability of a flying site. It is not uncommon to travel almost 150 miles, round trip, for a little Sunday afternoon flying. In view of this, equipment and planes should be designed to get the most out of the time available for flying. Guess we've stirred things around enough to start some wheel clicking so we'll drop the matter for now.

One of the most frequent complaints from the newcomer in RC work is that plans and schematics do not give all of the required details. This is especially true of parts and electronic components. As a designer who wishes to submit his design for publication, be sure to give the following information in the parts list: Description of part, type, maximum voltage used or nearest manufacturer's value, and manufacturer; especially if it is a special component. A source for special components would do in place of the manufacturer. For example: 22mmf, tubular-ceramic capacitor, GP (general purpose) or TC (temperature compensating) 10% (or the tolerance required), Centralab DC-220. Many times the beginner goes into a radio supply house and just asks for a 22mmf capacitor because that was all the information in the article. It's possible to get about a half dozen different kinds of 22mmf capacitors, the majority of which will work circuitwise but which differ in physical size.

Figure 2 might possibly be the answer to completely transistorized receivers, especially compact multi-channel units. Developed by Mr. Peter Kacoure, 148-09 Jamaica Avenue, Jamaica 35, N.Y., this front end could be applied to circuitry presented by Mr. I. Wallman in the November 1956 issue of MAN. It might also have possibilities for two-tube operation type receivers. Unfortunately, we were not able to finish building our unit due to lack of time, but after careful study, have decided to present the circuit in the hopes that it will speed up development work along this line. This is not a construction article and the circuit is not recommended for beginners, at least at the present time. It is suggested that it be built on a piece of 1/16" Micarta, or similar material, and that leads be kept short. The battery should be mounted as an essential part of the circuit. Following are a few important points on the selection of components and on the operation of the circuit.

With 2.6 volts supply, the current drain is ½ ma., and the resonant frequency decreases and the supply voltage decreases. With 2.6v the frequency is 27¼mc, decreasing to about 26mc when the (Continued on next page)

Cub Diesel powers well-known Fuchite, an Argentine design. Aerodynamically balanced flippers off Bonner-style compound escapement.



Berkeley Piper J-3, Bob Baltzell. Seen at Mirror Meet, craft uses a Fox .29, and Lorenz two-tube receiver. Water take-offs practical.

Radio Control News—*continued*

voltage drops to 1.3v. The use of mercury cells, and maintaining the voltage within the loadlife curves, should give well in excess of 30 hours use. This is possible when even the smallest size cells are used. With the battery being in the quench circuit, formed by the 50k resistor, .001 capacitor and the primary of the transformer, it is "hot" to hand effects. This can be minimized by proper circuit layout and the possible use of isolation chokes from the transformer (not shown). The antenna may be connected to either the collector or the emitter with about equal results. Connecting a long wire (about 3 to 4') to the emitter will cause the resonant frequency to lower and have a wider band spread. Increasing the battery voltage will give a greater current drain, higher operating frequency, more sensitivity. Placing a capacitor (about .1mf) across the secondary of the transformer, or a resistor (5 to 10k) across the primary, increases the rushing noise as the voltage is increased. The 25mmf capacitor between the emitter and collector is satisfactory for 27¼mc operation. Lowering the value (about 10mmf) increases the frequency (to about 45mc with the SB-100 transistor).

As to the correct parts to use, the RFC is not critical, but must be used to maintain low impedance at the quench frequency and high impedance at RF, 10-25 microhenries being in the correct range. The lmf electrolytic capacitor may be higher in value but lowering it will decrease the "Q" of the quench frequency (and output). The transformer value is not critical and several of the Argonne Transistor Transformers by Lafayette Radio may be substituted. The lmf capacitors are also available from Lafayette, made by several manufacturers. If the Philco SB-100 transistor is unavailable Lafayette sells the Philco AO-1, suitable for 27mc operation. Price is $2.18. The .001mf capacitor should be of the non-inductive type (a disc), otherwise peculiar responses may be noted during tuning.

Well, there it is. Who will be the first to fly with a tone or multi-channel unit based on the Wallman-Kacoure circuits? Pete's address is made available if anyone wishes to contact him regarding this circuit.

In closing Tech Topics this month we'll repeat some advice given in past columns. Mr. Harold Maltz of Lafayette Radio, advises those who write in regarding the detuning of carrier operated receivers (especially) when the tuning meter is removed, to do the following. Connect a .01 disc capacitor between B plus and ground and a .01 disc capacitor from each side of the meter jack to ground. Keep leads from meter plug to meter as short as possible. We make our leads from #14 wire, about 2 to 3 inches long. Excessively long leads act as a dipole, thus picking up excess signal power resulting in a false receiver setting once the meter is removed. This procedure should be followed on most carrier operated receivers, especially the ones using hard tubes.

CLUB NEWS

A letter from L. E. Ryback, Chief Engineer for radio station WGPA, Bethlehem, Pa., (*Continued on page* 48)

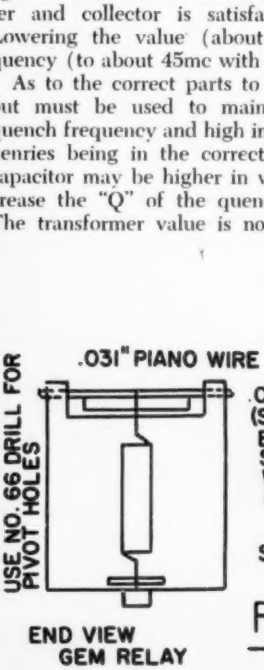


Fig. 1

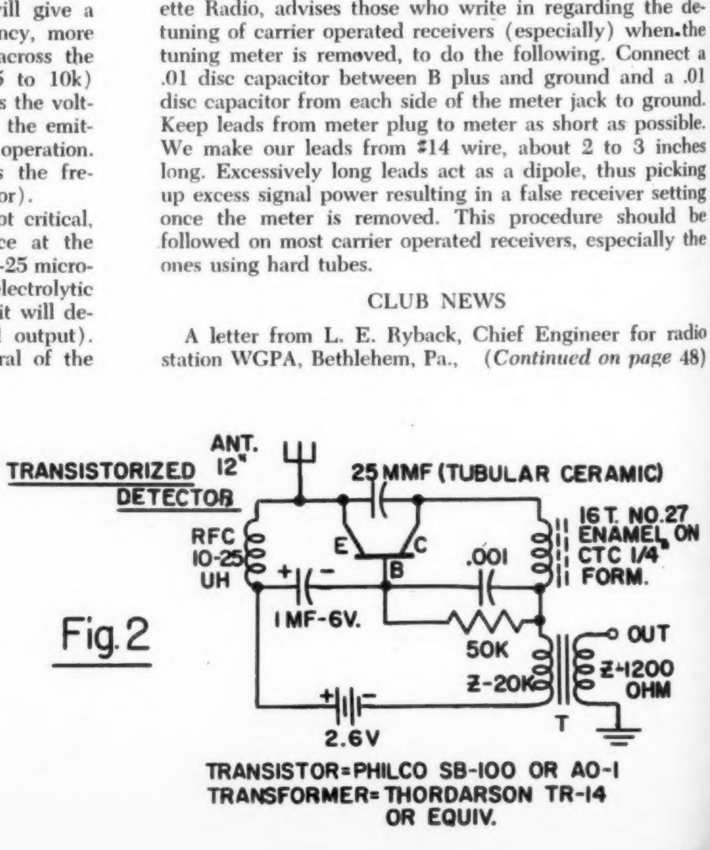
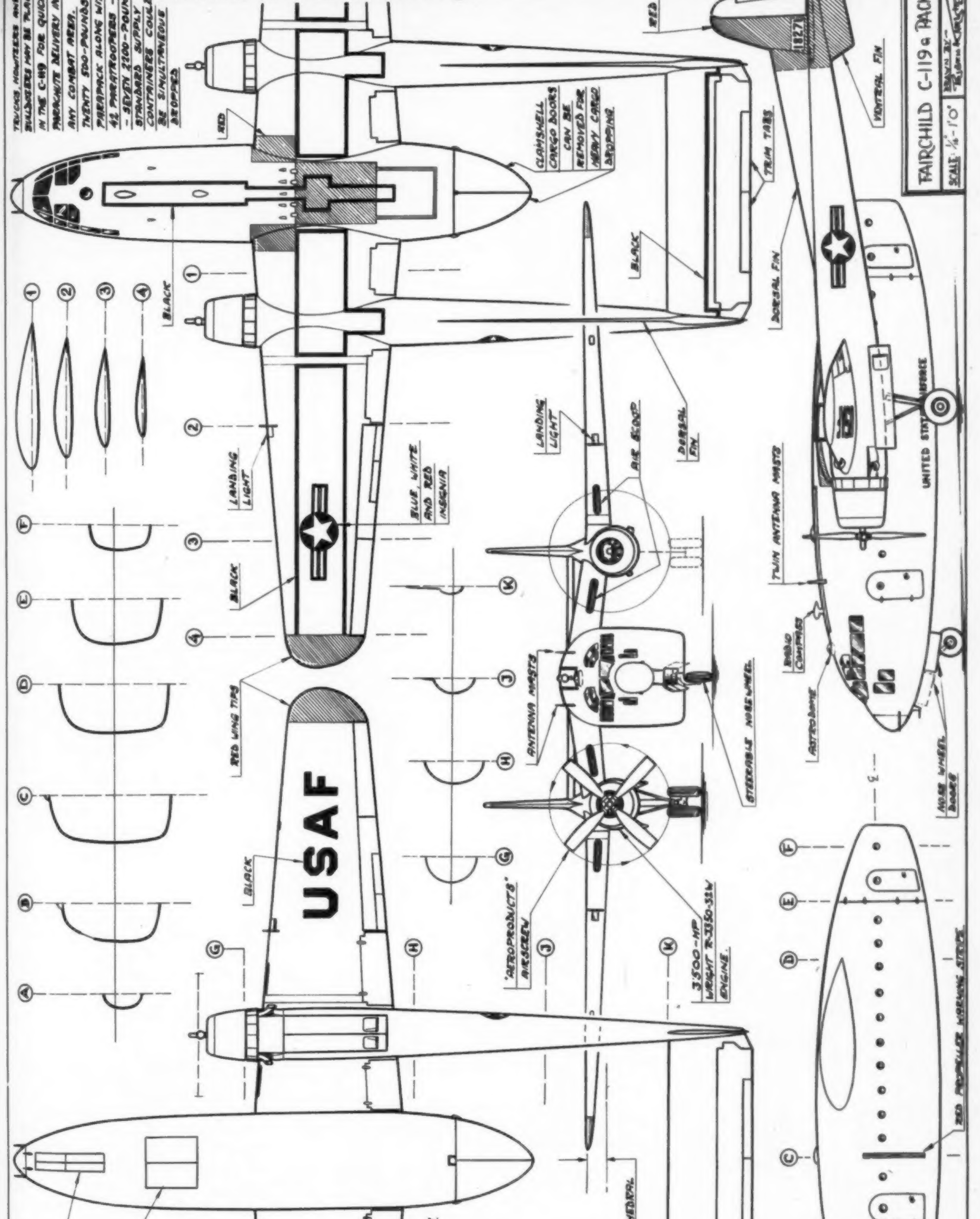
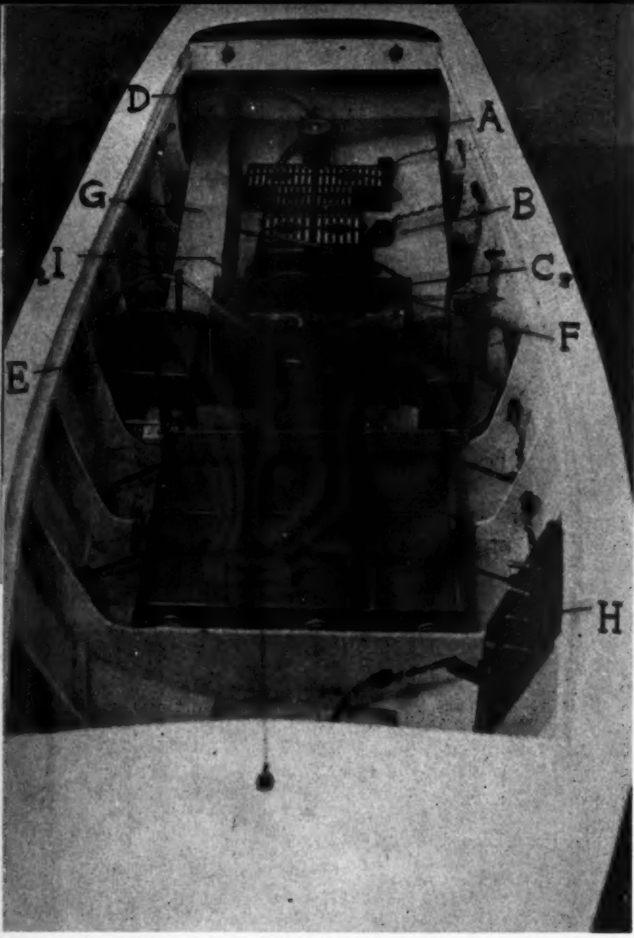


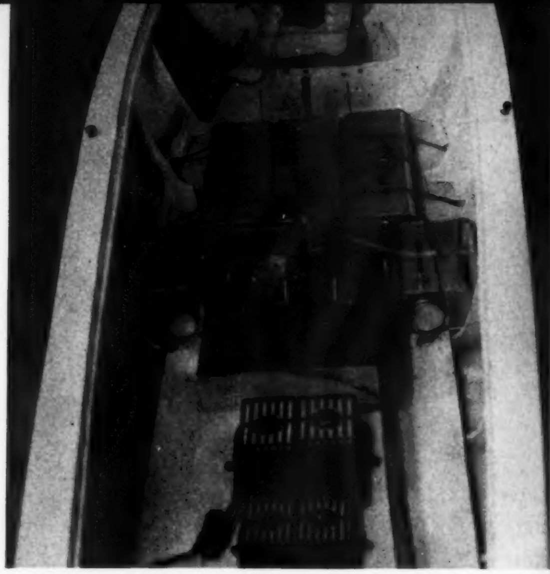
Fig. 2

Planes Worth Modeling— FAIRCHILD C-119G PACKET



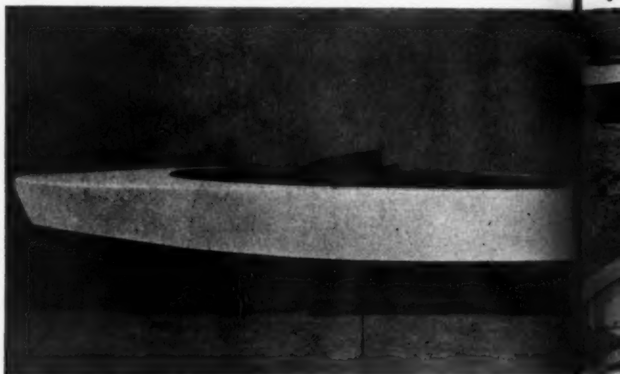


A—ED SN-type servo, 2 4½V bats., 1 ea. side; B—Terminal Strip for bats; C—8 x 10 copper pan, recessed for eng.; D—½ in. plastic tubing from 4½ x ¼ in., J—shaped brass-tube water scoop, back of prop; E—Water-jacketed Spitfire eng; F—T-fitting, water outlet, into exhaust pipe, through side; G—¼ x 2 in. balsa floor; H—Switches: A, B, C, and running lights; I—2 section, 1-in. brass exhaust.



Looking boward, with Citizen-Ship Dual Channel receiver on foam rubber mounting. Two channels give a selective right or left rudder.

For speed, carrying capacity, stability, hull based upon Monohedron design by Dr. Lindsey Lord, MIT, was selected. Hull 81 in. long.



The Big Smoothie

► For the past two years Southern Californian model boat builders have been talking about runinng an RC boat to Catalina Island. Quite a few boats have been built (conversationally, at least) for the attempt. The English channel was crossed with an RC boat several years ago, and the distance is about the same, 20 to 22 miles. The English channel has a nasty reputation among sailors, but I doubt if it was any worse than we had on our run. The channel chop, as the local sailors call it, was running nicely.

My first boat built for the trip was a 5-foot Catamaran, with an electric motor and a motor-cycle battery. It was much too slow, although it drew only 1½ inches of water.

The virtues of the Monohedron hull, as designed by Dr. Lindsey Lord of M.I.T. and used by several designers with great success, had been extolled by Barney Snyder every time we talked about a hull with the desired speed, carrying capacity and stability. When Barney handed me some drawings (small size) I decided to give them a try. The clincher was when he said he was about to desert sail and build a 30-foot power boat of monohedron design. I laid out the boat with few changes; the result was a hull 81 inches long with a 24 inch beam, flush decked. The keel is oak, frames marine plywood planked with balsa. The entire hull and decks are covered with Boat A fiberglass laid with Modelcraft resin. If I may be permitted to brag a bit, she is a beauty, as to both finish and performance. Al Woods, another old timer in the model business, called her a "Big Smoothie" while watching a test run, I can think of no better name.

The power plant is an Anderson .65, water-cooled, with a 16 oz. flywheel, 3/16" shaft, 2½ inch prop. Tanks are 8 one-quart cans, all feeding into one. One large tank would have required baffles to prevent surge and would have been difficult to fit into the boat.

The escapement is an E D motor-driven selective servo using 4½ volts.

Exactly four hours and 32 minutes after leaving the Los Angeles light we passed Bird Rock at the Isthmus, Cata-

How 8 1-quart fuel cans tied in—own baffle effect. Parallel fuel pipes, ½ in. oblong brass.

by ROBERT GREGORY

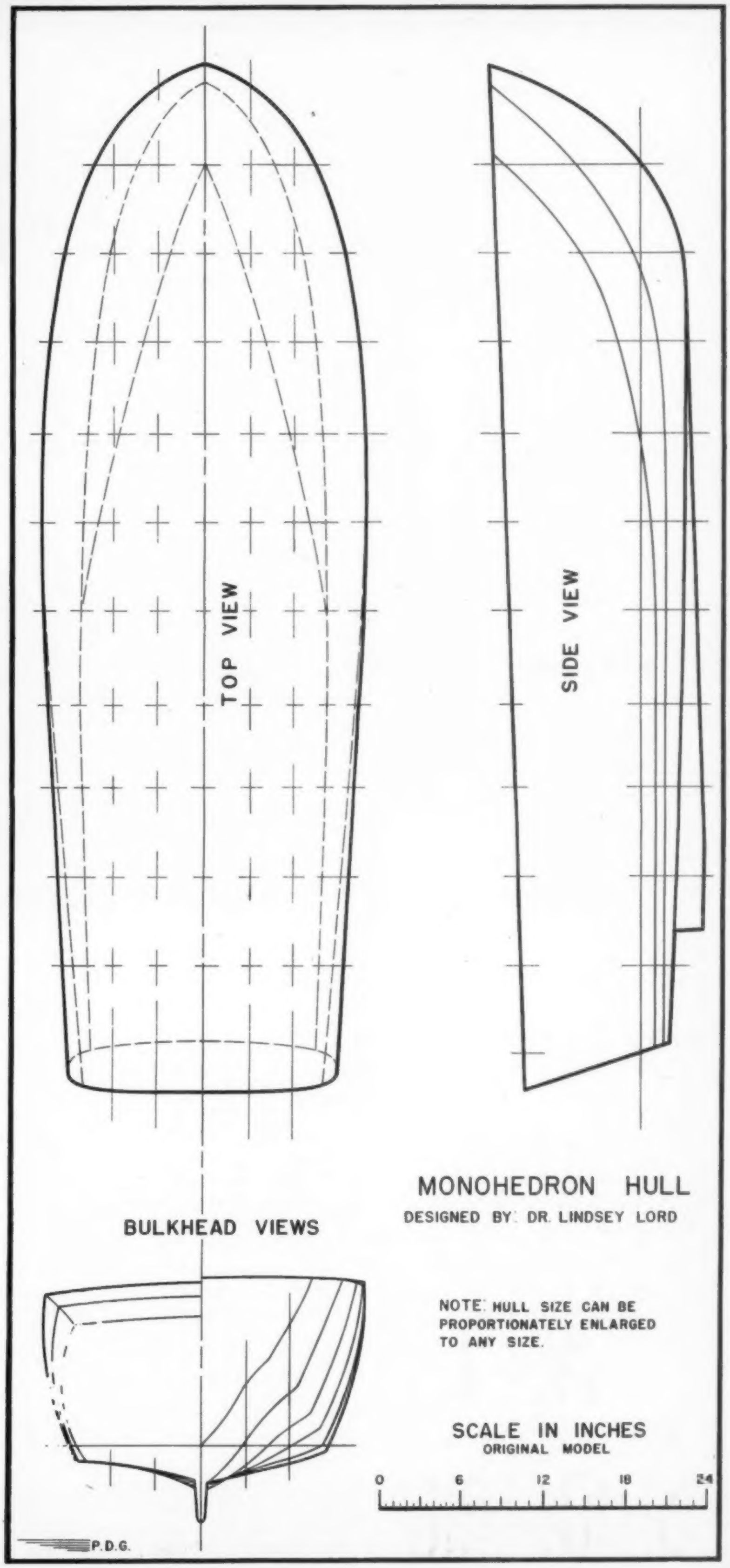
Design, development done, actual 3½-hour run to Catalina was "play." Features of amazing boat worth analysis.

You might ride in this one! Fuel is poured from gallon tins into funnel. Watertight top hatch.

lina Island, then circled into Fisherman's cove. Everything was working nicely so we went out again and started down the island for Avalon, where the steamers land. Running in the lee of the Island the water was fairly smooth and our boat picked up speed. At one time we were doing over thirteen miles per hour, so the skipper said. Big Smoothie was performing right to spec, riding level, not bow high as most planing hulls do, leaving a beautiful clean wake. A Monohedron hull is a little more work to build, it must be planked, but the results are worth all the extra work you do.

Near Whites Landing, about five or six miles from Avalon, and six hours after our start, Smoothie ran out of fuel and we took her aboard our boat. At no time did the radio gear, or the engine, or boat give any trouble. That's just one way of saying a good radio in the right boat with a reliable engine made the crossing uneventful even if the weather didn't cooperate.

For radio I selected Citizen-Ship 2-channel, so (*Continued on page* 45)



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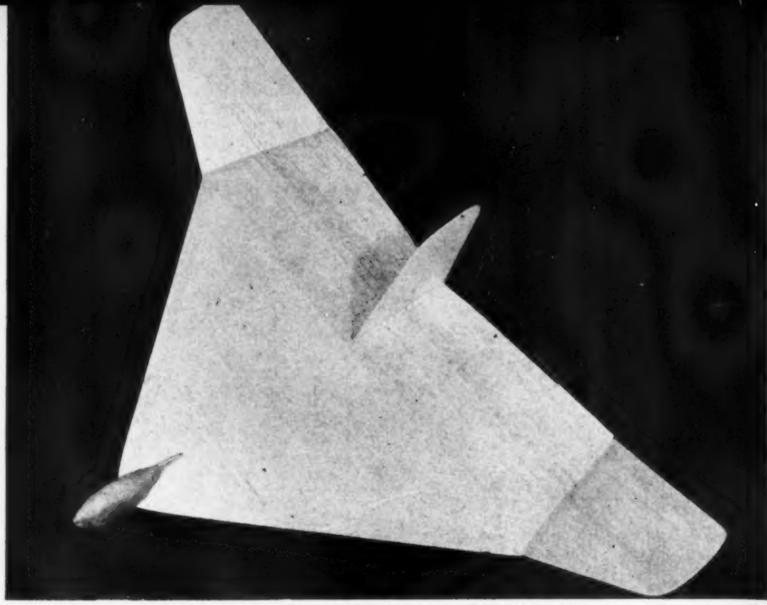
TESTOR CHEMICAL COMPANY • ROCKFORD, ILLINOIS

Jetex Delta

▼

by PAUL Del GATTO



This was the delta hand-launched glider which flew so well. A bigger blob of clay nose weight.

Nike? What's that? This simple machine will leave your breathless with 300-foot climbs.

► Originally, this model started out as a hand-launch experimental design over three years ago and, since that time, it has undergone many changes. As a hand-launch design it proved successful from its inception and, after modification of the rudder and fin area and the dihedral angle, its performance was comparable with good contest hand-launch designs.

Some of its characteristics, surprisingly enough, make it particularly suitable for a model builder who doesn't have the strength of a Hercules in his arm, for it will attain altitudes of 75 to 100 ft. with little effort, and we have been able to trim it for much higher altitudes. The design can be adjusted to do a roll at the top of the climb after which it dips slightly and quickly wheels into a tight turn; thus, it is ideally suited for thermal conditions.

Bringing the design up to date, the latest edition features Jetex installation, and all we can say about it is, "there just ain't enough room around no how!" Properly adjusted and launched as soon as the fuse is ignited, the Jetex takes over at just about the time that the model is approaching the peak of the hand-launch climb and the upward trajectory is sometimes continued to what we estimate to be an altitude of better than 300 ft.

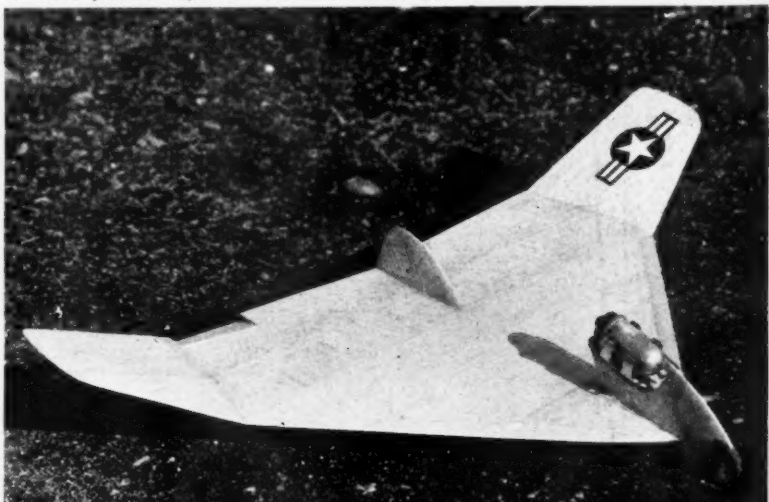
The construction of the model differs slightly from the standard type of glider construction because of its Delta configuration. However, the type of construction used is nonetheless quite simple to duplicate and exceptionally strong and very difficult to damage even under the most adverse conditions.

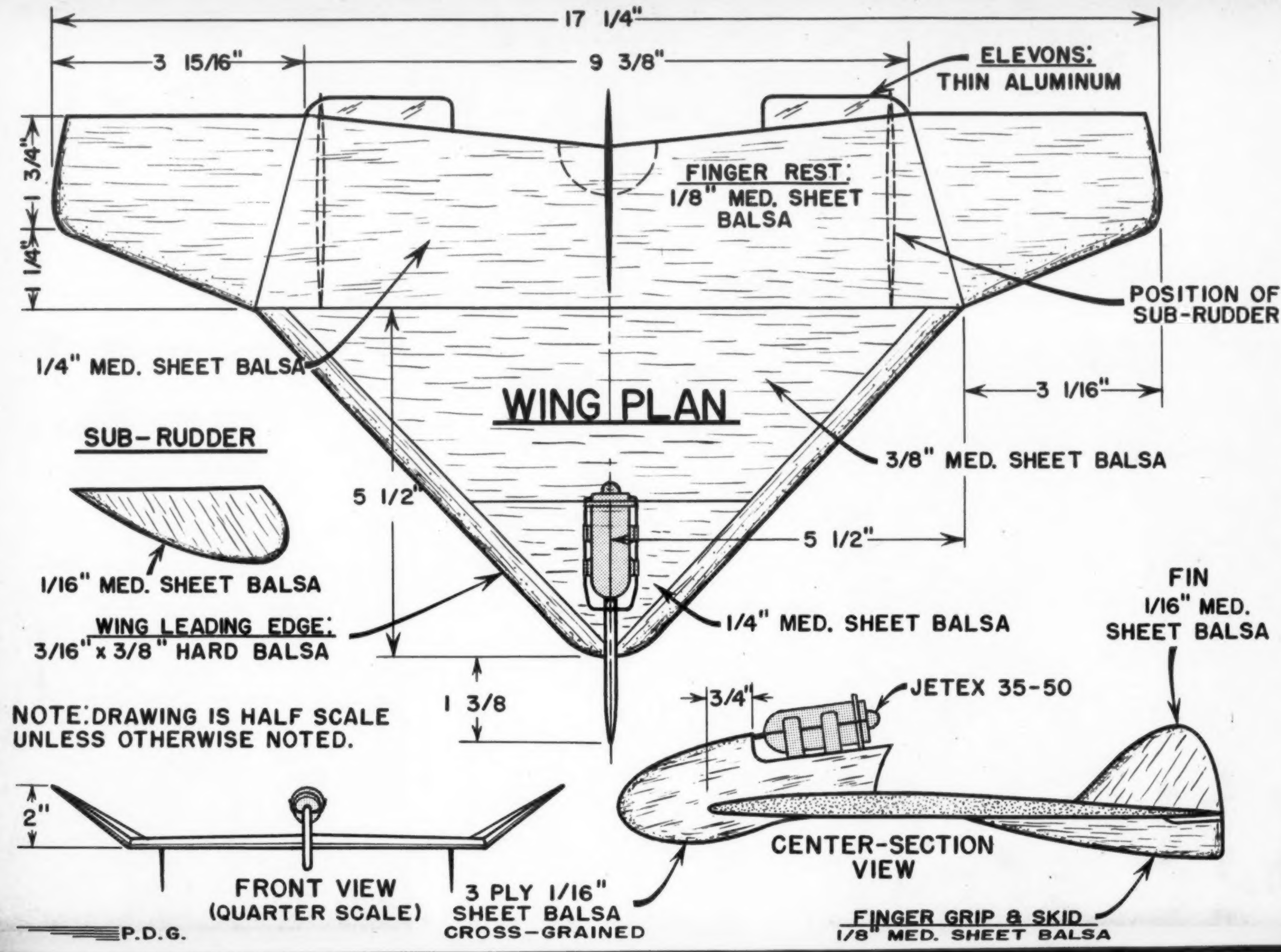
When constructing the model, exercise proper care to obtain a suitable airfoil section similar to that which is indicated on the plan. Use cement quite liberally, but not excessively. Apply three to four coats of dope and sand surfaces with fine sandpaper between coats and, for added luster and smoothness, apply a light coat of wax after the last coat and rub it gently into the dope finish.

The original model weighed less than two ounces ready to fly, with the grades of wood as specified on the plan. If you plan to use it just for testing the configuration, heavier stock can be employed throughout. From the amount of wing area the design contains, it could weigh three or more ounces and still perform satisfactorily.

We haven't tried it yet but we are of the opinion that, with the addition of a small engine nacelle at the nose, an Infant-powered free flight or .049-powered controlline version would also prove to be very successful. Whichever arrangement you try, you're bound for loads of flying fun with little expense and effort.

The rocket-powered sky-hook conversion. Slanted tips for stability; tabs for any adjustments.




17 1/4"
3 15/16"
9 3/8"
ELEVONS:
THIN ALUMINUM
1 3/4"
1 1/4"
FINGER REST:
1/8" MED. SHEET
BALSA
POSITION OF
SUB-RUDDER
1/4" MED. SHEET BALSA
WING PLAN
3 1/16"
3/8" MED. SHEET BALSA
SUB-RUDDER
5 1/2"
5 1/2"
1/16" MED. SHEET BALSA
WING LEADING EDGE:
3/16" x 3/8" HARD BALSA
1/4" MED. SHEET BALSA
FIN
1/16" MED.
SHEET BALSA
1 3/8
3/4"
JETEX 35-50
NOTE: DRAWING IS HALF SCALE
UNLESS OTHERWISE NOTED.
2"
CENTER-SECTION
VIEW
FRONT VIEW
(QUARTER SCALE)
3 PLY 1/16"
SHEET BALSA
CROSS-GRAINED
FINGER GRIP & SKID
1/8" MED. SHEET BALSA
P.D.G.

FOREIGN NOTES

A monthly world-wide round-up of technical developments, designs, significant industrial products.

P. G. F. CHINN

France—New FAI Rules

► Since our last Foreign Notes column was written, the decisions of the recent FAI Models Commission meeting held in Paris have become known. Ten countries sent delegates: Belgium, Great Britain, Czechoslovakia, France, Germany, Holland, Italy, Spain, Switzerland and Yugoslavia. Living up to its lately acquired reputation for providing a few surprises, plus material for lively controversy, the Commission has now ruled that the present four World Championships (Rubber, Power, Glider and C/L Speed) shall be grouped in pairs and held in alternate years.

Thus, for '57, we shall have only Glider (A2) and Speed (.15 cu. in.) events, these to be held in Czechoslovakia as that country won both Glider and Speed team awards last year. The Wakefield Rubber and FAI Power Championships will follow in 1958, probably being held in Britain.

As for the revised model specs which caused such a hullabaloo last year, the FAI proposed to adhere to their former decision to reduce rubber weight (Wakefield) from 80 to 50 grammes (1.75 oz.), but have compromised on the gas model power loading requirement with a new proposal of 300 grammes per c.c. of engine displacement—i.e. 173.4 oz./cu. in., or 8.67 oz. for a Half-A, 17.34 oz. for an .099 and 26 oz. for a .15.

These specifications, together with other, less important, changes, be it noted, are proposals and will only be adopted following approval (by postal vote) by national model organizations, to whom they are being circulated.

Other proposals include minimum and maximum wing-loadings of 20 to 50 grammes per sq. dm. (4.615 to 11.537 oz./100 sq. in.) in place of the standard FAI minimum loading of 12 grammes per sq. dm. of total area used hitherto for FAI gas models. Maximum size for a .15 cu. in. model (the maximum engine displacement permitted) thus becomes 550 sq. in. Motor run remains unaltered at 15 sec.

The vexed question of ROG was resolved by abolishing this rule in favor of one permitting hand launching for all types with the exception of RC models. This comes into effect immediately. Also coming into effect for 1957 is a modified stunt schedule in which a "double wingover" replaces the previous climb and dive maneuvers.

Team race rules were also discussed and it was agreed to limit the number of contestants in the circle to three. Amendments aimed at tightening up TR model specifications were also proposed. These (which only apply to the FAI .15 cu. in. contest class) include an increase in minimum wing area to 186 sq. in., with minimum fuselage cross-section dimensions of 3.94 x 1.97 in. and are being referred to member countries for approval, with a view to introduction in 1958.

Great Britain

Pan-American World Airways' new Jet-Payload class could mean a useful boost for Jetex type motors and, in England, the manufacturers of Jetex have responded with a new version of the popular Jetmaster-150. Known, appropriately, as the PAA-Loader, the new motor has a simplified end cap and jet assembly and weighs a bare ¾-oz. A much lighter mounting clip is also featured. The PAA-Loader is at present being manufactured only for the American market, but will be released for sale in the U.K. and elsewhere when stocks permit.

From far-off Saigon comes this picture of Vietnamese modelers, team racers, and ukie scale jobs.

Five truly beautiful World War 2 scale U-control models, also the handiwork of Vietnamese.

Japan

Results of the third Japanese Championships, to FAI rules, were as follows: *Rubber (Wakefield Class)* 1, Toshio Sato, perfect score of 900 sec.; 2, Heiji Sasaki 879 sec.; 3, Naonori Hirao 862 sec. Winner used Japanese square rubber of 1.2 mm. (.0472 or slightly over 3/64-in.) section. His model bore a resemblance to Saemann's '55 Wakefield winner.
Glider (Nordic A2 Class) 1, Yoshio Fujikawa 845 sec.; 2, Masao Mizorogi 723 sec.; 3, Hideo Endo 698 sec. Once again, German influence was evident with the winner using a Lindner type wing design.
F/F Gas (FAI Class) 1, Hikaru Suzuki 845 sec.; 2, Tatsuo Ishiguro 829 sec.; 3, Shoichi Tanaka 819 sec. Engines used were O.S. Max-15, Enya 15 and K. & B. Torpedo-15, respectively.

Australia

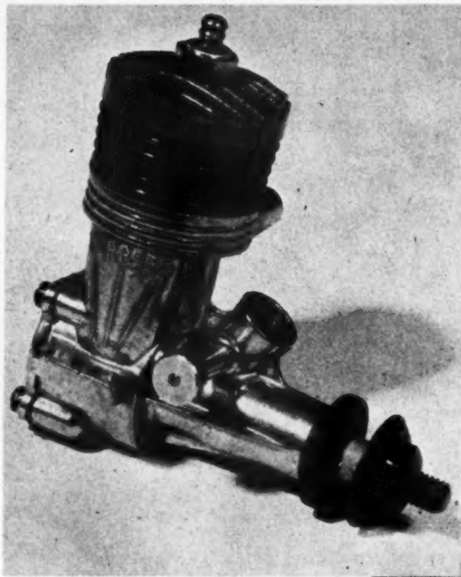
One of Australia's more active model clubs, the Newtown Model Aeronautical Association of Brisbane, recently ran an all-day, sponsored combat event. Thanks to the efforts of tireless secretary Arthur Gorrie and the sponsors, Listex Laboratories, manufacturers of "Jet" fly-spray, the day was highly successful and a large crowd turned up to watch the proceedings and (bless 'em) delight in the crackups. A huge trophy went to the winner and there were sundry other prizes, plus a plastic bottle of Jet fly-spray for every contestant. (You can guess the rest . .)

Italy

Last important European event of 1956 was the Italian 19th. *Concorso Nazionale* held, between showers and sun, at Capua on November 22/24. Teams from Milan, Turin and Venice in the north, to Cantania (Sicily) in the far south, attended the meet, which included seven classes: senior and junior, in gas, rubber and glider, plus a radio event.

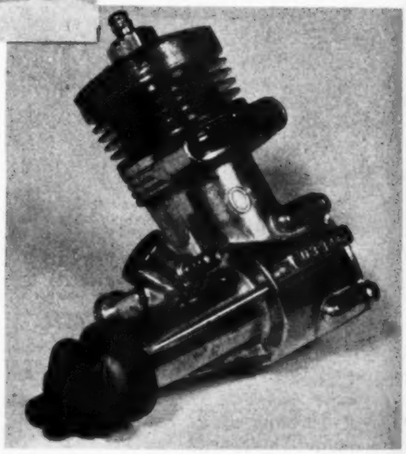
Senior individual champions were Andrea Possenti of Bologna (glider), Vincenzo Scardicchio of Bari (rubber) and Cesare Piazzoli of (*Continued on page* 52)

New Jetex PAA-Loader for Pan Am's jet pay class.



K&B Allyn .09 Engine Review

by E. C. MARTIN



Huge port areas and hefty crankshaft pay off in this short-stroke .09. Resembles older .15.

Potent .09 has almost 60% more power than early post-war great, the Arden .09. What is the magic formula?

► This new addition to the highly successful Torpedo range evokes the same comment as the appearance of the .15 three years ago. The smaller they get the prettier they look. Rather surprisingly, one can also add that the smaller they come the more powerful they get, because for its displacement the .09 is the hottest Torpedo of them all, giving roughly the same performance as the best .19 engines of six years ago.

Basically, the design of the .09 stems from its immediate predecessors, the .15 and 29R, incorporating many of the lessons learned from those engines, and becomes the first regular all-purpose Torpedo to feature a very short stroke. The other Torps have various stroke-bore ratios but none, apart from the 29R, depart very far from the square arrangement. This is interesting because stroke-bore ratio, in common with porting arrangements and ringed or lapped pistons, has long been a matter of controversy among model engine designers. The performance of the Torp .15 and several other notable engines, including the Series 20 McCoy .60, seemed to indicate that ultra short stroke was a lost cause. The Dooling and Atwood machinery said otherwise, and when you live through the experience of seeing your latest-up-to-the-minute pride and joy, a short-stroke .19, being successfully dragged by a long-stroke .15 you begin to doubt the laws of nature. The law in question, which is self evident, is simply that power ultimately depends on piston area. The bigger the area, the bigger the bore and circumference, and therefore the bigger the possible port area. Power is in direct proportion to volumetric efficiency which depends on port area, so that a big bore with large piston area has to give the most power if the rest of the engine will allow, and if it does not, then the bottleneck is elsewhere in the engine.

The Torpedo .15 has a bore of .580 and

(*Continued on page* 53)

The Gambler

(*Continued from page* 12)

not change any of the force arrangements —thrust line, nose and tail moments, etc. It is usually beneficial to use a thicker size of wood for the tail surfaces. Although the manufacturer tries to use grade AA balsa, there is always some rock-hard balsa. Replace this balsa with soft, light balsa. Softer wood is easier to work with and saves vital weight.

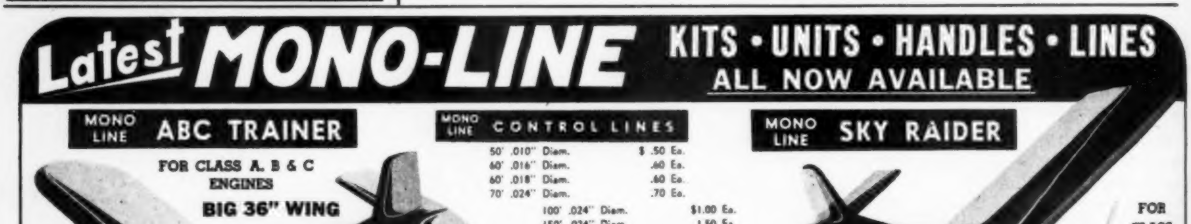
Probably one of the greatest misconceptions about the control-line model is that it must have almost 90 degrees of elevator movement, and plenty of control surface area. This simply is not true. There are many good contest fliers who use very little control and area. Too many times the beginner will crack up a perfectly sound model by using excessive control surface movement which acts as a brake, rather than as a control, thus causing a loss of speed and control that results in disaster. Therefore, it is wise to go easy at first: 35 to 40 degrees of elevator movement is sufficient.

One of the most important requirements in stunt flying is to know your engine. Choose one of the popular makes and familiarize yourself with it. Run about one quart of "cool" fuel (Sport fuel—Editor) through the engine at very rich settings on the bench. This will serve to break in the engine enough to permit its use in a model. Here it is wise to make progress slowly; again run the engine slowly. Use only enough power to maintain airspeed for the first few flights and then gradually increase the power until enough speed is attained to permit horizontal eights. Keep this setting and run another two quarts of fuel through the engine while doing eights. This procedure permits a gradual break-in under the load and good cooling. A new engine will never put out the same amount of power that a properly broken-in engine will as it usually takes approximately one and one-half to two hours for an engine to reach peak power.

Many good commercial tanks on the market are of basically sound design. However, most of them employ a two vent, non-pressurized system. This system is adequate for most maneuvers but it lacks sufficient fuel pressure in the square stunts, the engine starves and loses power resulting in sloppy stunts with round corners. The solution is fuel pressure. There are many systems but I will deal with the two simplest. The first is simply the extension of the neoprene leads from the vents and the cutting of the ends at 45 degree angles into the wind. The second consists of removing both vents, sealing the bottom hole, and replacing the top vent with a piece of copper tubing of the same diameter. This tubing is filed to an angle of 45 degrees and inserted with the angle facing to the rear of the tank. The tubing is soldered and the tank checked for leaks. After the tank is installed the vent is carefully bent to the front so that it faces directly into the wind. This second method is probably the best because it eliminates all possibility of blow-back through the other vent. And now about the airplane.

GAMBLER

This is not an original design in the strict sense of the word because there is nothing truly original in stunt design Every design incorporates some tried and true features. The Gambler was designed to fly the treacherous Mirror pattern which includes all the AMA maneuvers and then some. Since most of these maneuvers are extremely complicated, I concluded that



I would need a design which combined these features: (1) ability to turn tightly without mushing; (2) ability to stay out on the lines at all times; (3) good appearance.

Since the construction is conventional for the most part, I am going to skip the step-by-step procedure and give the evolution of the design which will be of more help to the flier who desires to create his own design as well.

All of us have drawn sketches of dream planes we hope to build. There is no reason why they cannot be built if rules of stunt design are not violated. If the following process is faithfully followed, I can guarantee that you will have the basis of a good model. However, since the final product is up to the skill of the builder, I cannot assure anyone he will have the best plane ever built.

Most of the present designs employ approximately 500 square inches of wing area. This is adequate but requires the careful watching of weight in order to keep the radius of turn fairly small. There is, however, a solution which brings many benefits with it. If the area is increased to over 600 square inches, three benefits immediately come to light: (1) weight is no problem because the wing loading will remain fairly low; (2) stunts become smoother with less tendency to mush; (3) overall speed is reduced somewhat but control is improved because of the extra lift.

A great many words have been written about the types of airfoils to use for various planes. Suffice it to say that they generally fall into two categories: (1) the thin foil, from 1¼ to 1¾ inches thick, which is best suited to the smaller model because of its stabilizing characteristics; (2) the thick section, from 1¾ to 2¼ inches thick, which is suited to the larger model because of its ability to generate more lift per square inch of wing area. This is advantageous because of the critical power loading in large, heavy models.

Most of the stunt designs use flaps to increase the efficiency of the airfoil. There is controversy about the real need for flaps, but a good general rule for their use is: if the plane will exceed 35 ounces and has a wing area under 450 square inches, then employ them. However, never exceed more than 20 degrees of movement.

Body design doesn't seem to be very critical if the side area is kept fairly low. Large side area catches wind gusts, causing buffeting, so don't go hog wild with huge rudders. However, some attention should be paid to the nose and tail moments. These moments are measured from the tip of the nose to the proposed center of gravity and from the CG to the pivot point of the stabilizer. The ratio between nose and tail moments should be approximately one to 1½.

One of the things seldom considered is the placement of the landing gear. The best position is slightly ahead of the center of gravity. It is also best to use as short a gear as possible in order to increase ground stability. The body should be positioned so that the thrust line is almost parallel to the ground. This permits longer, smoother, and more realistic take-offs.

The cowl of the Gambler resembles the type of cowl generally used on speed models. It is built up from two blocks so the shape can be anything the builder desires. Leave enough space, however, for reliable engine operation. This cowl can

(Continued on page 44)

greatly enhance the beauty of the plane so use liberal amounts of plastic balsa and sandpaper.

The accent in stunt planes increasingly is toward the clean, slick-finished design. Many times the outcome of a contest is decided by these vital appearance points. Therefore, no matter how much time and elbow grease is required, the results are worth it. The Gambler won the Mirror Meet by only three points, and the full appearance points it garnered helped in no small way. Take pride in your plane and give it a good finish. Here is a good procedure to follow:

(1) Completely sand the finished framework with #3 sandpaper and give two coats of clear dope, sanding well between coats.
(2) Cover carefully all over with heavy Silkspan. Apply four coats of thick clear dope, sanding carefully between coats.
(3) Mix some talcum powder and clear dope together in about 50-50 proportions and thin well. Apply ten coats, sanding well with #240 wet-or-dry paper.
(4) Apply two very thin coats of clear dope to seal the pores of the wood.
(5) Thin the colored dope well and apply four coats of the lightest color first; trim and apply four coats of the darker trim color.
(6) Rub down the finish carefully and apply a good coat of clear paste wax.

Flying this plane can be a real pleasure, but again it is wise to proceed slowly. Check the tank to make sure that there is no balsa clogging it. Flip the propeller to be certain that there is enough clearance between the spinner and the body. Check the wheels for free roll. Work the controls to free them from the tendency that the dope has to stick them. Don't fly the Gambler until it is balanced according to the plans, otherwise it becomes extremely sensitive and hard to fly.

The Gambler flies best on 65 feet of .012 cable, with a Tornado 10x6 propeller. Any good .35" will provide sufficient power, but it is wise to use your hottest engine.

See you at the next contest?

MAN at Work

(*Continued from page 7*)

same since. Neither has the Cougar. Trucks and headstones offer considerable resistance to the passage of model aircraft. Chuck scores heavily on those wonderful Japanese solids. Made out of Japanese hardwood that is delightful to carve—provided you keep sharp honed edges on the knife, they are finished in a fast, hard-drying Japanese lacquer. His MAN subscription is looked forward to with almost as much anticipation as his separation from active duty. That's really looking forward, as some people will tell you.

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► Flying Scale Models (Model Aeronautical Press Ltd., Herts, Eng.), by R. G. Moulton, is a sensationally fine book, brilliantly organized and presented with numerous pictures and drawings—definitely not a "quickie" . . . impressive Official Pilot Certificate, for flying model airplanes, is awarded by Carl Goldberg Models to anyone who is able to equal or better the flying time listed on each CG kit. Best to date is a mark of 1:38.8, made by a Spirit of St. Louis, flown by Gerald Elliott at the Cleveland Press Indoor Contest. For a tiny pre-fab, that's real flying . . . cute story from Mrs. Lee Galloway. Pop is one of the standout ukie scale builders, had an F4B-4 that won a table full of trophies. When pop dived the thing at the concrete

during a contest, ma fell over in a dead faint. When she revived, pop had won first place, people were congratulating him, and the loud speaker was pleading for blankets to heap on the Mrs. . . . on the PA system during a Cuban model demonstration for the Air Force, a clairvoyant Lt. Col. kept calling his shots. "I would lie to see a head-on crash," the Col. would say and, boing, a head-on crash. Tony Alvarado, there, says the buzzards much puzzled by RC (that makes two of us) and fly formation with the crates . . . Army men interested in the forthcoming All-Army Model Airplane Meet, will be able to get plans of Army planes from: Crafts Section, Col. L. Jackson, Chief, Special Services Division, TAGO, Dept. of the Army, Washington 25, D.C. . . . Monogram's Jack Bessar grabbing national publicity right and left for company's plastics. Hired a psychologist to explain why people like to build models. Naturally, this fascinates the press. Subject of report? "The Meaning of Models in the Life of the American Male."

° ° °

► Flying Bisons (47 Stenzil St., North Tonowanda, N.Y.), a Buffalo Club, still in business, according to Howard Thomas, Publicity Chairman yet. Formal meetings, round-table discussions. Combination wintertime free flight and ukie meet for members a howling success, despite years of goofing with RC. Big RC invite, fly-together on July 4, 5, 6. . . . See by Testor Topics, a house organ, that firm has opened balsa plant in Puerto Rico. Talk of ukie kit production, too . . . F. M. Skylarks, new club with 25 members from Fargo, N. Dak., and Moorhead, Minn. Meet second and fourth Wednesdays, interested in kids. Write James Skaarer, 1410 9 Ave., So., Fargo, N. Dak. C. A. Zaic Co. tells us they gave wrong price in last issue on Jetco Mustang F-51N. Should have been $9.95.

Your hobby shop always out of balsa? M. B. Borman, of Ouito, Ecuador, S.A., where they grow the stuff, has trouble too. "Strange as it seems!" says Borman, "it is difficult to get locally." You can't win.

The Big Smoothie

(*Continued from page* 31)

as to have selective right and left rudder. Also, because I have three of this manufacturer's single-channel units which have given excellent service in other boats. The seven batteries carried are all Burgess: two 67½ volt, two 4½ volt, two 7½ volt and one 1½ volt. The tanks, prop, shaft, and water cooling of the engine was done for me by Al Woods.

On my first attempt to reach the island I was using ignition, with 1½ gallons of gas and oil for fuel. Less than 5 minutes after leaving the Los Angeles harbor light, the engine quit. It was ignition trouble and I couldn't find the difficulty. The gas was dumped, a Champion glow plug installed, and tanks were filled with one gallon of K & B 100 glow fuel—all I had with me. Everything worked fine until we were about five miles from the Island, when Big Smoothie ran out of fuel.

Two weeks later, having installed two more quart cans, bringing our tankage up to the present two gallons, we started out again. This time we had two gallons of K & B 100 aboard, and again a Champion glow plug.

We left the Los Angeles harbor light at about 7:50 A.M. with the Anderson running rich. Big Smoothie wasn't smooth. She rolled, bobbed, wallowed, and stopped whenever a wave hit her, but she really moved out when the wave passed. In the

first hour we made about 1½ miles.

Barney told me later a friend of his brought a sailboat down from Santa Barbara, getting in about eight hours before we started. He ran into an off-shore wind about half way down that gave him a two hour dusting while running under a double-reefed main. The storm was local and did not reach us but the resulting rough water did.

As we got farther out the chop decreased (I was told it would) and the model picked up speed. There were a few porpoise and one inquisitive shark but none of them interfered with Big Smoothie.

A Ducted Fan Douglas B-66

(*Continued from page* 21)

dummy engine pods could also be made extremely light and directional stability problems inherent in twin-engine models would be eliminated.

Before we get into consrtuction details, however, I would like to stress the necessity for keeping the weight down and the use of a relatively hot engine capable of turning the fan in the neighborhood of 16 to 20,000 rpm. Target weights to shoot for, which were the actual weights of the components of the airplane pictured are:

WEIGHT OF STRUCTURAL COMPONENTS BEFORE COVERING WITH TISSUE

Wing	1.59 oz.
Body with rudder	5.78
Stabilizer	.25
Two nacelles	1.02
Total less engine, fan & fuel tank	8.64 oz.

AIRPLANE COMPLETE READY TO FLY

Body	7.45 oz.
Wing	2.38
Two Nacelles	1.51
Engine and fan	1.83
Total weight	13.17 oz.

As can be seen, this is extremely light for an airplane of this size and can be achieved only by careful selection of soft, straight-grained balsa and lightweight basswood plywood.

CONSTRUCTION DETAILS

1. Cutout all bulkheads, ribs, and engine mount supports, carefully identifying each and marking centerlines and attaching structure points.
2. Solder 3-48 nuts to a strip of tin for engine attachment and cement to plywood engine mount with Ambroid cement.
3. Sub-assemble engine mount supports Y and Z to bulkheads F and G. Tie and cement engine mount with Ambroid. Assemble fuel tank and tie in place. Tie fuel and vent lines in place.
4. Lay out ⅛ sq. main side longerons on the plans and mark bulkhead positions. Cement to engine mount support structure assembly.
5. Add remaining bulkheads, longerons, and cross braces.
6. Bend nose-wheel wire so that wheel will be on the centerline of the airplane and tie and cement to plywood support. Cement assembly in place.
7. Build up hatch assembly within the opening and add ⅛ in. sheet balsa members between bulkheads as noted in cross section view of main landing gear installation. Install ⅛ dia. alinement pins and latching mechanism.
8. Wire and solder together the main landing gear and tie and cement in place.
9. Assemble the tail cone in two sections and fit to the fuselage. Before installing, apply two coats of nitrate dope, two coats of Silver Aerogloss, followed by a coat of Comet Hot Fuel Proof dope. Apply the same doping process to the engine mount structure.
10. Apply this same process to a sheet of Art Paper about 15 x 18 in. (This is the type paper school kids use to make colored designs, etc.) Use this to form a duct within the aft portion of the fuselage from Bulkhead G to M.
11. The thrust deflector is made from soft .020 aluminum and is installed along with the aft section of the tail cone.
12. Add windshield members and assemble the removable section of the wing within the fuselage to assure proper alinement.
13. Plank double contoured sections of the fuselage with 1/16 in. sheet strips. Sand down to about 1/32 in. thickness. Single contoured sections are covered with Art Paper. Carve the nose from a medium hard balsa block and hollow out.
14. Cut wing spars from ⅛ in. balsa sheet and taper from root rib to 3/16 in. camber at the tip rib. Notch for intermediate ribs. Cut root rib from ⅛ in. balsa. Cement ⅛ in. sheet rectangles to the forward section of the ribs and cut to contour by sighting along the wing.
15. Assemble the wing halves to the mid section by notching and tapering the spars to produce the 2 degrees incidence and 1 inch dihedral. Add wire hooks for attaching to fuselage and add dowels and hooks for attaching the jet nacelles. Scrap pieces of balsa are added at hooks and dowels wherever they protrude through the paper to keep the paper from wrinkling when doped.

(*Continued on page* 48)

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16. Fair in the wing to fuselage intersection with Art Paper.
17. The rudder may be built up as a separate assembly before installing on the fuselage. Cover with light weight Silkspan tissue and apply two coats clear nitrate dope. Cut out opening for contour of stabilizer.
18. Assemble stabilizer in two sections and add dihedral as noted. Cover and dope same as rudder. Install and add Art Paper fairing.
19. Assemble jet nacelles and plank fore and aft sections with 1/16 in. balsa strips. Sand down to about 1/32 in. thickness and cover center section with Art Paper.
20. Solder 3/32 in. inside diameter washers to landing gear wires to hold wheels in place.
21. Areas on the fuselage and wing not planked or covered with Art Paper are covered with light weight Silkspan tissue and given two coats of clear nitrate dope. Areas on the wing, fuselage and nacelles that are planked or covered with Art Paper are given a coat of sanding sealer followed by two coats of clear nitrate dope. Sand between coats. The complete airplane is then sprayed with silver Aero-gloss dope.
22. Cut lettering from black trim film and star insignias from red, white and blue trim film. The bumble-bee is painted on with plastic model enamels. Body of bee is yellow, bomb is red, outline of bee is black as are legs and fins on bomb. Wings and eye of the bee are white. Lettering on bomb is white.
23. Paint the anti-glare area and lower radome on the airplane nose dull black and the aft round radome and rectangle on the rudder yellow. Outline control surfaces with a lettering pen and black dope.
24. The windshield and windows are covered with .020 cellulose acetate following which brush on a coat of Comet Hot Fuel Proof dope over the entire airplane.
25. Cut the six bladed fan from soft .040 aluminum, filing airfoil sections and adding camber as shown. Bend blades to produce about 30 degrees pitch at the tips. Be sure to bend the blades to produce the reverse thrust required.
26. Construct a special screwdriver from a piece of music wire about 18 inches long for use in installing the Cox Thermal Hopper engine. Install the self-starter spring and the fan and you are now ready to go, but please read the rest.

Test Gliding and Flying

1. First check the balance point on the airplane to determine the C G location. It must not be aft of the position shown to avoid future difficulties under power. The model glides and flies fairly fast so pick some tall grass for initial glides.
2. After the glide has been properly adjusted and before any power runs are attempted, a word of caution is necessary. This engine will turn this size fan from 16,000 to 22,000 rpm which is a lot of centrifugal force acting on the blades. So be darn careful before each flight to check to see that there are no cracks developing at the root of the blades. It's also advisable to keep spectators and yourself out of the line of the fan while the hatch is off.
3. Make your first flight attempts as ROG's with the thrust deflector gent slightly down. If the model shows no tendency to get airborne, bend up the deflector slightly and try again. A take-off run of 100 to 200 feet will be required so don't get over anxious. Happy landings.

Fans manufactured by R. J. Hetherington, 4434 Eagle Rock Blvd., Los Angeles, Calif.

Radio Control News

(*Continued from page 28*)

points out what we stated, in the January '57 issue, that the CG Electronics Corp. tone receiver and transmitter were not available in kit form. We wish to apologize and make the correction that the single-channel tone receiver R-1 and the matching T-12 transmitter are available in kit form for $19.95 and $22.95 respectively. Mr. Ryback has also built two of the CG 5-channel receivers and reports complete satisfaction and operation.

Jim Thrift, Program Chairman of the North Carolina, Radio Control group sent in a copy of the Skywriters Bulletin, covering the five-state contest held in Winston-Salem last fall. A rather disappointing note was observed in that the RC competitive flying was down a bit from that of the previous season. This was in spite of the fact that there are about 100 active RC fliers in North Carolina alone. What is the reason for this and similar happenings around the country? We think it boils down to economics. If the day is too windy, the engine isn't running properly or something else is present that would not make for a good RC flight, there is no flight. A flier has a considerable amount of money and work tied up in the average RC plane and he just isn't going to take a chance on loosing it or having it crack up. Many times, contest flying conditions are not what they should be and the prizes no more than for rubber-powered contests. In view of this the RC flier is content to wait until things improve and he is free of the pressure under which contest flying is often done. If radio control receivers and equipment were from ⅛ to 1/10 the present prices, the average flier would probably take a chance and fly at any time the free flight or U-control boys went up. This is a common happening all over the country. Very few RC fliers come out to contests but rather prefer to Sunday fly at their leisure.

Mr. E. H. Schoenberg, 2759 E. 94th Street, Seattle. Wash. sends in photos. One is the PT-19, built and flown by Gene Britzuis of that area. This ship has won first place in every RC contest in which it was entered. Gene has been crowned the 'RC flier of the year' for the Seattle area. No details were given on the RC equipment but close examination indicates it is a multi-control ship. This proves that RC scale jobs can really fly with the rest of them. Another photo shows a fleet of R6B's against a background of wide open space. This ship, a powered glider type, has been very successful in Australia, New Zealand, and England, and now in this country.

Lester E. Wilson, President of the New England RC Modellers, 1 Short Street, Bedford, Mass., advises that the 1956 New England RC Championships meet brought out over 50 contestants and over 500 spectators. Pete Lambert of Shrewsbury, Mass., was the high-point man for the meet, as well as first-place winner in the AMA rudder-only event. Pete also picked up points for 2nd place in the spot landing event and 2nd in the one-mile race (four ¼-mile laps). Dick Ryan, Mechanicsville, N.Y., was top man in the multi-control event with Harvey Thomasian taking first in the one-mile race: Carl Wing being on top in the Novelty Event; Ray Mierzejewski in Spot Landing, and Buzz Ferguson in the Beauty Contest (for the plane that is). This active group runs quite a few events other than just rudder-only and multi-control. It might be wise for other groups to contact them as to what these events cover.

Last month we gave some information

on the Argentine's RC Nationals, held at Merlo, Argentina last fall. Mr. Juan Pablo Ossoinak sends in more photos, taken at the event. These prove that RC fliers, the world over, operate in the same way. They still wind escapements, take pictures and rope off a pit area. One photo shows the plane designed by Jose Iriarte, built and flown by Mr. Ossoinak, who took 4th place. This 40-inch model used an OK .074 for power and the RC gear was a home-made 3v4 receiver. Rudder, elevator, and engine control were obtained, using compound-type escapements. The dynamically compensated elevators worked on the third position of the compound and the air-bleed engine control worked from a ¼-ounce home-made escapement. From all of the pictures and writing we've had concerning foreign RC flying, it would certainly be interesting to have a real International meet.

Ernie Kratzet, 482 St. Clair, Grosse Pointe 30, Mich., fills in a little on the activities in his area. Last month it was announced that a Mid-West Winter RC Convention would be held on March 9th, Trilby Log Cabin, Alexis and Secor Roads in Toledo, Ohio. Nothing was mentioned about flying, since this was strictly a convention aimed at exchanging ideas, circuits etc. If an engine can be started and the weather isn't too cold, we bet there'll be some flying. Just a little preview info on some new Bramco equipment shows that they have an 8-channel job weighing 7 ounces and having but a 10 ma filament drain. They also have a new single-channel receiver which idles at ½ ma, with relay current rising to 5 or as much as 8 ma (depending on B voltage supply) with signal. Looks like another fascinating year for RC and we'll have more details on this equipment in a later issue. With the new Ohio Turnpike connecting with the Pennsylvania Turnpike, plus all the other connections, it looks like there will be more intra-state flying this year.

Although mentioned before, we'd like to point out that your club can get a little publicity and perhaps a little cash in the treasury if you put on some RC demonstrations at public functions. This is especially true with boats or cars. The KC RC club of Kansas City did this at the recent Midwest Sport Show held at the Kansas City Municipal Auditorium in February. They used several Ace Dolphin RC boats which are part of the demonstration. Polk's Cheryl Ann boats are used at Disneyland. Banners towed behind planes can carry a local merchant's name. Something to think about anyway.

More food for thought from the LARKS in the Los Angeles area. A discussion was had at an RC club meeting to determine just what the members were looking for from their club. Following are the items which were listed. RC contest discussions, elementary radio, RC trouble shooting, RC movies, advanced radio and transistors, design, reports on magazine articles, contest judging, reports on new radio gear, materials and uses, RC pilot training and aerodynamics and flight adjustments. After the ballots were counted, RC movies were number one choice with elementary radio ranking second. Any other club have such a tabulation?

NEW ITEMS

A new relay a month seems to be the average for this column. The latest to be made available for the RC fan is Micro Gem, made by the Jaidinger Company. This new version of the popular 5,000- and 7,500-ohm Gem relay features screw-

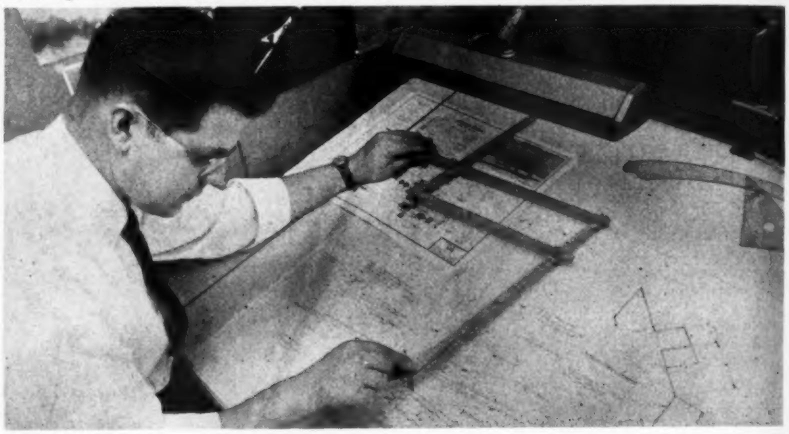
(*Continued on page* 51)

With a place like this to work in it's easy to dream up ideas and to draw those plans.

On the board is a prop-driven MIG, scaled up by means of the pantograph as described.

Pantograph attaches to upper, left corner of drawing board. The left hand steadies it.

Pantograph is adjusted according to the desired scale enlargement. Good for airfoils.



ENLARGE those 3 Views

Plane outlines to any size made easy with a pantograph.

by ALBERT E. CHRISTEN

► A relatively easy way to enlarge small three-view drawings is by the use of a pantograph. A pantograph is an instrument which can enlarge or reduce a picture or aircraft plan by simply tracing a point over the smaller plan while a sharpened lead creates the larger image. A practical pantograph made of wood may be purchased for approximately $2 and will be useful to any model builder who is eager to enlarge scale drawings from a magazine or other source. Directions accompanying each pantograph explain the various adjustments possible.

To set up this equipment, it is best to fasten the pantograph bracket securely to the upper portion of your drafting board or other flat surface. With the left hand steadying the instrument, and the first tracing point following the canopy on the small three-view drawing, the right hand can guide the pencil point which will then create a larger drawing. If there are several curves, such as fillets or tail outlines, make pencil dots ¼ in. apart and then blend in the lines with a French curve. A French curve is an irregularly curved piece of plastic or other material which is used for drawing curved lines. One can be purchased for aboue 50c at most stationery stores.

With your pantograph—plus only a little practice and patience—you can enlarge any scale drawing you may wish. It will help to remember, in the initial stages, that you will find yourself with a larger drawing including valuable body and wing sections. Then you can design into your drawing your own ideas of body construction, motor mounting and other favorite variations. Study designs currently appearing in this magazine for good ideas of what the fellows are doing.

I have found that making "in-between" size drawing is a necessary prelude to a final, very large plan. The second photograph shows how a small fuselage, only a few inches long, was enlarged, via an in-between drawing, to one several feet long. Notice the small original drawing by the left hand which was used as an example. To the right of it is the in-between enlargement and, below, stretching across the entire bottom of the drawing, is the finished fuselage.

Pretty nice—no? Let the pantograph work for you in blowing up your own favorite scale jobs.

Radio Control News

(*Continued from page 49*)

adjustable contacts, thus making this subminiature relay much better suited for critical applications. All hobby dealers handling RC equipment, should have this new $4.95 model by the time you read this issue. The first models will be with a 5,000-ohm coil, the 7,500-ohm coil model coming out later. Incidentally, the regular fixed-contact Gem relay, 5,000-ohm coil, is now available at the new price of $4.25.

Wet cells are considered excellent for RC use, especially where fairly high current capacity in a small volume is desired. The big drawback to their use in the past has been possible leaks in the case and the fact that they must be kept in a charged condition in order to perform properly. Ace Radio Control, Box 301, Higginsville, Mo., now carries the Magnalux Wet Cell. Measuring ⅜" x 1-1/16" x 1⅜" and weighing less than 1 ounce, these cells put out approximately 2 volts and are close to being a leakproof cell as any we have yet seen. They have the property of being able to recharge themselves without an external charging source for a considerable number of cycles. We'll have some interesting data on these cells in a coming issue, after our tests are completed. The main feature we like is their ability to remain stored for a long period of time without being used or charged and still maintain their current and voltage output. So far, we've had several units under test for about six months, utilizing only their initial charge. They still deliver two volts at no load and 1.8 volts with 600ma load. These cells should do much to solve the problem of low weight and high-current demands for your new installation. The amazing part of the whole thing is the price of but 75 cents. More on these later.

Another item from Ace Radio Control which we feel more RC builders should know about is the Allen-Bradley pots. These potentiometers are considered to be superior to any other unit as far as stability is concerned.

What we believe to be the smallest air trimmer capacitor, is made by the Radio Condenser Company, Camden 3, N.J. This model is made in three capacity ranges: 1.2 to 5mmf, 1.2 to 10mmf and 1.3 to 15mmf. The mounting base measures about ⅜" x 7/16" and the overall length is less than ½", excluding the connector tabs. These units are the ultimate for sub-miniature work and for printed wiring applications. Available only from the manufacturer at $2.50 each.

New model 22X receiver, manufactured by Gyro Electronics Co., 325 Canal Street, N.Y.C., utilizes two sub-miniature hard tubes. This two-ounce unit is housed in a plastic box measuring 1¾ x 2¼ x 1¼. Antenna length is not critical and neither is the tuning. Relay current is zero with no signal, rising to 3ma with a signal (22½ B supply), and higher with a higher B supply voltage. This is a really compact and efficient receiver, sold with an installation kit, and fully tested, for $22.30 with relay. Deduct $5.45 if no relay is desired.

ESSCO, or Electronic Specialties, 58 Walker Street, N.Y.C., has two new receivers, the R41TDX and the R61LZX. The R41TDX, selling for $19.95 with relay, is a two-tube unit, utilizing an XFG-1 in the first stage and a 1AG4 or a CK521 in the second stage. The relay current change averages from 2.5 to 3ma, rising from zero upon receipt of a signal. The output stage is connected as a pentode and thus eliminates some of the problems of the plate current creeping upwards when the set is

idling. The R61LZX is a transistorized second-stage receiver, selling for $21.95 with relay, ready to operate. The current change through the relay with this receiver is from 4 to 6ma, more than enough to give top performance from the GEM relay. This set also uses the XFG-1 in the detector stage, thus making for a compact and reliable unit. Both units come in a neat plastic case and include a quality sub-miniature pot, of a type not usually found in model work. Operation was found to be quite satisfactory.

Polk's Modelcraft Hobbies, 314 Fifth Avenue, N.Y.C., has extra brushes for the Mighty Midget motors for 25 cents per pair and extra reduction gear sets for 45 cents. The gear set includes both the pinion and the large gear. The small one-inch diameter 0-1, 0-5 and 0-50ma color-coded meters are now available at $5.95 each. Photo shows a 35-cent horn kit by Aristo-Craft, 184 Pensylvania Avenue, Newark 12, N.J. This would make a realistic horn for RC tug or car. Operation is from a 1½- to 4½-volt battery. Also from Aristo-Craft are a few new electric motors. Two units are imports from the Far East and sell for $1.00 and $2.50. The $2.50 unit has ball bearings. The other motors are the famous German units which feature extremely low-current drain. Both units have double ball bearings and the standard 3- to 4½-volt model sells for $3.00 and the new 1½-volt unit for $3.50.

Top Flite Models, Inc., of Chicago, now offers many new sizes of propellers designed especially for RC. These are the Top Flite sizes: 11-3, 11-4, 11-5, 11-6, 11-8, 12-3, 12-4, 12-5 and 12-8. Price is 35 cents each. They also have the POWER PROP in sizes 11-3, 11-4, 11-6 11-8, 12-3, 12-4, 12-6 and 12-8 for 35 cents each. Large 13 and 14" props are also available for the larger engines at 40 cents each, in addition to new sizes in 6- and 7-in. plastic props.

How about that FCC registration you haven't sent in yet? Our campaign is still on in the hopes that it will show the FCC that we need another frequency or two. Be sure to send one in for both 27.255mc and 465mc if you happen to have both transmitters.

Foreign Notes

(*Continued from page* 37)

Milan (FAI gas). Incidentally, no less than six seniors returned perfect 5 x 3 min. scores in the rubber event. Winning fly-off time was 8:50. Champion Club was Turin with 2577 points, 11 points ahead of Milan, followed by Reggio Emilia, Bologna, Monfalcone, Rome, Florence, Catania and Perugia. Worth noting is that a drop of only 18% separted 10th. place Perugia from Turin.

East Germany

A new pulse-jet has appeared in East Germany and, apparently, is intended for limited production. Known as the Victoria MD-1, it exhibits one or two departures from the usual Dyna-Jet copy layout. There is a cowl over the valve head, which extends forward to form side intakes and a 4.2 oz. cylindrical gas tank. This increases the length of the complete motor to nearly 32 in. Twelve valve petals, instead of the usual ten, are employed and the motor has a claimed thrust of 3.3 lb. for a dry weight of 13.2 oz.

This extreme forward mounting of the fuel tank has, of course, been tried before. For pure speed work with a minimum model it does suffer the disadvantage of a drastic change in c.g. position between the beginning and end of a flight due to the heavy fuel consumption of all-pulse-jets.

West Germany

Just arived from Germany: a new ultra-sensitive, lightweight 8-reed relay. Made by A. Pfeil of Hildensheim (incidentally, no connection with the German model writer of the same name) this is an extremely neat piece of work weighing only 1.65 oz. and, if the promise of its bench performance is borne out by flight tests, should be sought after by many multi enthusiasts. Overall dimensions are a mere 1.8 x 1.6 x 1.3 in.

Vietnam

We are constantly being pleasantly surprised by evidence of keen interest in model aviation in the more remote corners of the globe and in the high standards of modelling that come to our notice from some of these places. The latest to claim our attention is the Republic of Vietnam. Control-line scale seems to be a favorite with many Far Eastern modelers and the Vietnamese appear to be no exception to this. From Saigon come pictures of fine u/c Mustangs, Thunderbolts, Corsairs, Typhoons and the like.

Up to the present, Vietnamese modelers have labored under considerable difficulty due to lack of adequate supplies and an effective organizing body to look after their interests, but it is now reported that this is receiving attention and that the appropriate government department is giving consideration to the question of official support.

Czechoslovakia

A new motor has lately appeared from the workshops of A. Machacek of Prague, maker of the well-known Czech AMA engines. This is a .22 cu. in. glow motor, quite unlike previous AMA designs and having the usual American features of shaft induction and a prop-scavenged cylinder. Bore is 17 mm., stroke 16 mm. and compression ratio 8.5. The motor is stated as achieving 12,000 rpm on a 8¾ x 5½ prop, using straight methanol and castor fuel.

Norway

Another item of engine news is that Norwegian manufacturer, Jan David-Andersen, has been experimenting with new piston and cylinder designs aimed at achieving uniform expansion rates, improved piston seal and better performance. With the engine hot, the piston can be placed at top dead center and will hold compression for minutes without leakage. Performance improvements of up to 10% have also been obtained.

Third-Line U-Reely

(*Continued from page* 23)

rotational tendencies of the auxiliary reel, thus permitting the standard two reel U-Reely to work independently of the auxiliary reel.

Construction consists mainly of 1/16" and ¼" plywood.

REEL

1. Cut out core marked A from ¼" ply.
2. Cut out faces, two required, marked B & C, from 1/16" ply. Do not drill holes for 5-40 screws as yet.
3. Coat contact surfaces of pieces A, B & C with contact cement (Pliobond, etc.). Let dry till tacky and clamp all three together till dry.
4. Drill three holes for 5-40 screws and bolt together with heads of screws on outside face of B as shown in typical cross-section.

GUIDES

1. Cut out guide pieces D (2 required) from 1/16" ply.
2. Cut out fillers marked E (2 required) from 1/16" ply.
3. Cut out filler F from ¼" ply.
4. Sand all surfaces and coat surfaces of pieces D, E and F with contact cement. When cement is tacky, clamp all five

pieces together. Do not drill positioning holes as yet.

5. When guide unit is dry, round off (if desired) and sand assembly smooth.

ASSEMBLY

1. Cut the head of a 10-32 ¾" long screw. File notch so that screw can be driven tight into U-Reely extension as shown.

2. Place reel in guide, as shown in cross-section. Then fit over U-Reely extension and 10-32 screw. Position guide, as shown on drawing. Mark off position of lock bar on guide. Remove assembly and notch guide for bar as shown on drawing.

Replace assembly on U-Reely as before and clamp to the U-Reely with C clamps. Drill positioning holes through guides and U-Reely for 4-40 screws. Remove clamps and place washers between guide and U-Reely body and bolt with the 4-40 screws (1¼" lg.). Place washer and nut on 10-32 mounting screw and assembly is complete.

Note: If suitable wing nut is available for the mounting screw, this should be used in lieu of a standard nut. This willl eliminate the necessity of using a lug wrench to engage or disengage the auxiliary reel.

Engine Review

(*Continued from page* 38)

a stroke of .555 giving a ratio of .957. The .09 with .521 bore and .465 stroke has a ratio of .892. The .15 was outstanding for two reasons, one because of its rigidity and low friction, and, two, because of its very large port area in relation to bore diameter and piston area. The same ratio of port area to piston area built into the short-stroke .09 therefore logically produces a more powerful engine. The K&B engines have several times shown that the old story is still the right one after all. Remember lapped versus ringed pistons, and opposed versus radical porting? By careful testing and observation, and practical refinement, these engines have frequently separated the wheat from the chaff, and while on the subject of port area, it is interesting to see that the bypass port on the .09 takes up all the available space, whereas the exhaust port could easily be made bigger, and in fact does not utilize the full width of the stack. Many authorities claim that a large exhaust is unnecessary and even desirable but that, within the bounds of reason, the bigger the bypass the better. Their argument is that the exhaust gases escape at high pressure and consequently attain a high velocity. The resulting momentum leaves a slight depression in the cylinder adjacent to the exhaust port, and also in the stack, which tends to divert the upward path of the incoming charge so that some of it goes straight across and out of the exhaust port thus causing lost power. If the exhaust port of an engine in which this was happening was reduced in area by the correct amount to suit the RPM, at which maximum power was reached, then this charge loss would be avoided and power would be increased accordingly. It is one of the inherent disadvantages of the two-cycle engine, in its conventional form, that the exhaust port always closes after the bypass, thus making some degree of charge loss unavoidable at all speeds lower than that for which the port areas were designed. Obviously if the exhaust port is too small the exhaust residue will resist the incoming charge and also cause lost power, and therefore the dimensioning of the ports is a very critical matter where optimum results are desired at any one speed. It seems virtually impossible to calculate these dimensions because no one

really knows what goes on in the cylinder at high speed. All one can do is work on a hypothesis until it is proved wrong, or, better still, keep filing the holes bigger until the power stops increasing, which is what we suspect Johnny Brodbeck did with the .09.

Comparison of the K&B .09 with the famous Arden .09 of yesteryear is irresistible as they each represent the peak of development of their day in this displacement. The Arden turned out about .14 bhp against .24 bhp from the new K&B. The Arden exhaust port area is the greater by far, and many will remember its penetrating voice, whereas its bypass port opening is relatively small against that of the K&B, thus illustrating the previous paragraph. However, the most significant difference of all is in bearing areas and the trend towards greater rigidity. Shaft diameters are all exactly 25% larger, and lengths increased by almost the same amount. The rotary valve port area is nearly doubled and intake cross section up by half. On the other hand, overall height is reduced so that weight has only increased by 25% for almost twice the power. There are still a few old timers around who recall the great days of the Arden and will vouch for its stamina, and though they may tear out their beards at such sacrilege, we cannot pay the K&B .09 any greater compliment than by saying it is a better, stronger, hotter engine.

Constructionally, the .09 is similar in every way to the .15 apart from the piston, which has a very shallow converging taper along its axis, starting just below its upper edge and providing a lead for the baffle and sharp edges of the piston crown as they pass the ports, thus preventing abrasion.

Handling and Performance

If you have occasion to strip and reassemble the .09, take particular care to insert the cylinder into the main casting gently. The bypass passage is very large and the cylinder can be easily distorted if tilted into this passage during assembly.

Starting the .09 presents no difficulties and the needle valve has a very wide tolerance both for starting and maximum power. An exhaust prime is usually necessary for surefire starts, but is no indication that suction is poor. On the score of vibration, this engine is exceptionally smooth at all speeds and will make many friends for this reason alone.

The instructions stress the need for a gentle rich mixture break-in of at least forty-five minutes, and judging from the development of the piston wear pattern on the test engine during break-in, we suggest you obey this religiously. One should watch for the disappearance of the slight scuff marks on the piston before turning up the wick. Lack of tightness is not the only sign with this type of piston and cylinder.

Test.

Plug:- K&B Torpedo ¼-32 Short Reach as supplied.

Running Time prior to test:-1½ hours.

Bore:- .521 Stroke:- .465 Weight:- 2¾ ounces.

Power Prop	*R.P.M.*	*Top Flite*	*R.P.M.*
7 x 6	11,900	7 x 6	10,500
7 x 4	13,000	7 x 4	11,800
6 x 5	13,550	6 x 5	13,000
6 x 4	15,000	6 x 4	14,300
6 x 3	16,200	6 x 3	15,300
5¾ x 5	14,900		

(EDITOR'S NOTE—Future engine reviews will include K & B Allyn .049 Sky Fury; O & R .049 Mite; and the new McCoy .35. The May issue will include another Import Review.)

The Long Project

(*Continued from page* 19)

To proceed further we now needed a glider with all Mk 2's performance, but with far more docile handling qualities and with so many turns available to the relaytor that to use them all would be impossible. We realized that we had reached the point where neither model nor radio was the limiting factor. Man was now the weakest link, and to get any further the strain on him had to be alleviated.

So Mk 2 was given away (its present owner seems afraid to fly it!) and Mk 3 was built. A smaller, lighter model, it had all speed and performance but it was no good. I found that to handle a strong wind, sheer weight and inertia are as essential as basic speed. Mk 3 just did not inspire confidence.

Mk 4 was built to much the same size and weight as Mk 2, but with wing and tail sections and CG altered. The wing section needs explaining. Years ago I learned of a technique used to explore airflow nature over full-size sailplanes; namely to fly them at a selected speed in dew conditions and to observe dew deposits immediately after landing. Turbulent flow scrubs dew off; a dew deposit infers laminar flow (See Fig. 6.). I have observed dew deposits on the varnished wings of my models over several years, and I can only suggest that anyone who thinks of wing airflow at this model size as laminar at the leading edge and turbulent behind some transition point is in for a rude shock. The sketches indicate typical patterns. The subject is complex and is most thoroughly explained in reports of very recent flow investigations by Mr. M. M. Gates of the MARP. The point I want to make here is that there are sound theoretical reasons for the choice of what is certainly a most unusual section for a glider. Extraordinarily flat glide and low sinking speed has fully justified the experiment.

Mark 4 was one of those unusual models which flew beautifully and docilely from the start. Completed about November '54 it was worked up and ready for the steady-wind season of Jan-Mar '55. A first attempt in January blew back at three hours when the wind increased too much, despite a definite speed increase obtained with a moderate down elevator setting. This made us think. The technique we had used was to trim "down" such that the model could still be turned with care: flight pattern remained the same regardless of wind strength. For example, the flight that blew back had started in a light wind in which the model was flown at low speed to and fro along above the cliff. As wind speed increased the model had angled more and more into wind until the point had been reached where it was headed directly into wind—with further increase in wind speed it would have blown back. At this point down had been applied (in practice there was a period of oscillation between up and down) and the to-and-fro flight pattern resumed. With further increase of wind speed the point was again reached where the glider was headed directly into wind, this time in fast trim. This was its limit. Further increase blew it back, and the flight was over. And yet we knew that the model could be driven much faster provided that it was not required to be safe in a turn. So we altered our technique.

We now trim down to the highest speed at which we feel it is safe to drive the model; at this trim any turn at all is virtually impossible. We use down solely to drive the model straight out into wind. When it is far enough out we return it to up and it blows slowly back overhead,

to be driven out yet again as often as necessary. Flight pattern becomes a crosswind beat to and fro along the cliff at all wind speeds up to that at which the model is headed directly into wind in low-speed trim, and a fast and slow alternation with the model headed straight into wind all the time, at all wind speeds which are greater. In practice this technique has proven sound. It does use all the speed the model has to offer. It is also very much easier on the operator as in a strong wind the model is held straight, not far away, in the easiest part of the sky to see, all the time. I admit however that it requires considerable faith to snap on "down" and watch, relaxed, while the model hightails it out to sea.

During the next few days we learned this technique as we flew the model repeatedly in a moderate gale. Conditions were far from ideal. Seagulls were buffeting on shortened wings. But the ideal day never comes, so as long as conditions were possible, we tried, but that gale beat us every time. Finally, the model hit a house while it was diving downwind, and by the time the rebuilding was finished the gale had blown itself out.

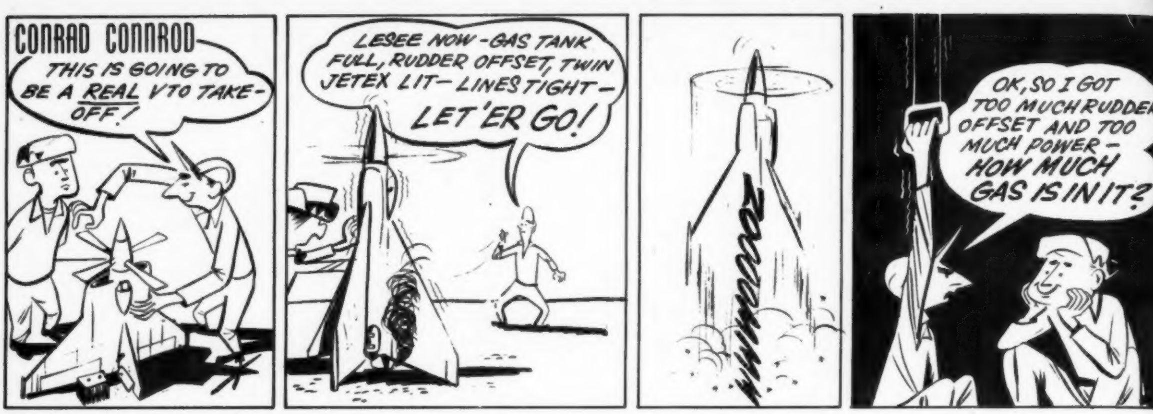
To prove reliability, trim, and handling after repair, I flew it one afternoon over an inland ridge about 20 miles from Sydney, Australia. Wind was a 20 knot Southerly, and a group of friends came along to share the fun. The model was fine, but the inland location was not. During an hour's flight two fair-weather clouds blew by overhead, and the model rose high above the ridge under the influence of the associated thermals, then subsided back toward it as they passed away. Then the sky quietly cleared. This I noticed, but did not think fast enough. A few minutes later the model began to go up again, and by the time I became concerned and took over again it was very high and going up fast. I did all I dared to get it down—remember, steep dives are out because of wing flutter—but without success. It disappeared in a clear sky directly overhead, still controlling perfectly. Search and publicity proved fruitless. That is the first model of any consequence that I have lost in nearly thirty years of modeling.

Furious with myself both for risking the model and for losing it in the middle of the steady-wind season, I dropped all other interests and built Mark 5 in a hurry. This is the model that did the job, and it represents the current high point of development, so I will deal with it fairly thoroughly.

The receiver uses a 3V4 output tube, and gives a current swing of from 0.25ma to 6ma. Filament supply is a three oz. pack of four Kaliums, from which about 33 hours safe operation can be expected at normal temperatures. The 45-volt HT supply is two batteries which weigh seven ozs. total. Many hundreds of hours operation can be relied upon from them.

The primary (rudder) relaytor is set to pull in a 3ma and drop out at 2ma under working torque. It is driven by a 70" loop of 3/16th by 1/24th rubber through a 3 to 1 step-up gear. Wound 30 turns per inch (approx. 50% breaking turns) this gives 70 x 30 x 3, or 6,300 turns total. As a few hundred are not available at the slack end, I consider 6,000 available. The elevator relaytor is operated by quick-snap and is driven by a 36" length of ¼th by 1/24th. Available turns are many times more than could ever be used.

Dimensionally the model is similar to Mk 4 (See Fig. 7), but is a little smaller, (75" span against 82") and in order to go faster, is deliberately heavier (50 ozs. minimum against 45 ozs.) Wings have been



thinned to eight percent (See Fig. 8), and the thin tail, previously a weak point, is now amply rigid due to geodetics. Every effort was made to avoid flutter troubles by keeping the wings stiff in torsion. The function of the many surface stringers is solely to divide the heavy paper covering into many small rectangles, and thus increase its property of stabilizing against twist.

Flight tests revealed altogether unexpected performance in that the glide is noticeably flatter than in any of the preceding models. This is probably due to the thinner surfaces, together with the two secondary effects of increased Reynolds number, and possible development of low-drag laminar flow across the bottom as well as the top of the wing. Lower drag was indicated by the necessity to ballast the CG to a position further forward (42%) than that used previously (47%) in order to obtain the same longitudinal stability and low-speed behaviour. This model was, in fact, rather a beast to trim up. I know exactly the handling characteristics I want from a model that is to spend hours over a cliff. Its turn must be prompt and powerful enough to be effective in moderate turbulence, in order to keep adequate control of it while landing. The turn must be reasonably tight, so that the model spends little time out of the lift near the cliff edge when turning around at each end of the beat in light winds. The trim must be such that the model can be turned, without blipping, up to 180 degrees without significant loss of height or increase in speed. Above all the model's response must be clean, accurate, and predictable at all times, otherwise the strain on the operator becomes intolerable before very long. This sort of handling has become more and more difficult to attain as the gliders have become cleaner and faster. It took about three weeks of trimming sessions to get Mark 5's low-speed trim right, and two further sessions on the cliff before we were certain that high-speed trim was the fastest we dared employ. Not until then did my friends and I begin to scan the weather map for the prospect of a suitable day.

A brief and savage session in a near gale, to check the practicability of a 400-foot West coast escarpment, proved the model to be amazingly strong and to have speed enough to handle anything short of a full gale. The site was found impractical, as we had the greatest difficulty in keeping the glider from being swept up into the cloud base.

A week later, a day which had been forecast calm, April 2nd, dawned with a light North Easterly breeze. By 9:30 AM I judged it steady enough to warrant an attempt, although without much real hope. Helpers quickly agreed to assist, and I went to the workshop to wind the model. To my horror I found it switched on—I had demonstrated the gear to a friend the previous evening and must have left it switched on overnight. To make up and install a new LT supply would take perhaps 45 minutes, but time was getting short if we were to exceed the existing 6-hour record before nightfall. I estimated the partly used Kaliums to have flown 5 hours and to have run a further 14 hours overnight, and the longest possible flight that day would be 7 to 8 hours until darkness; all told, 27 hours total use. Theoretical life was 33 hours safe. I decided to save the time, and left the partly used cells installed.

Don and I took the model to a nearby well-tried 160-foot coastal cliff. The tow launch was started 300 yards back to avoid low-level turbulence troubles which are to be expected nearer the edge: once the model was well up on the line I towed it right to the brink before releasing at 11:01 A.M. Wind was light NE, slightly unstable. The glider soared easily up to 600 to 800 feet.

On previous attempts we had tried flying both 30-minute and 20-minute spells, but had found them rather too long. This time we began flying 15-minute spells. We found that flight periods passed very quickly, yet rest time was adequate: this schedule proved ideal so we adhered to it rigidly right through the day. We knew that comfort and freedom from tiredness were going to be important. We shifted camp a little way along the cliff edge to where a solitary copse of 40-foot trees cast a welcome shadow. The Northern sky under the midday sun was brilliant, glaring, with bright fluffy clouds, and was hard on the eyes. We deliberately tucked our shady camp close in under the trees, then flew the model to and fro in the softer Southern sky. Not until the glare to the North softened in the afternoon did we begin to use the whole 700-yard length of the cliff for our beat. Our general attitude is well indicated by the fact that both Don and I dozed stretched out in the sun during some of the earlier rests—to the amazement of one or two onlookers who apparently thought such behavior unseemly on such an occasion. I mention these things in some detail because they are important. A highly developed and well understood model, perfectly built and prepared to the point where one ceases to worry about it, will not fail. But the man flying it has failed, time and time again in our experience; always some marginal casual error, characteristic of a tired man, which has lead directly to the failure of an attempt. How alert and accurate one is going to be during the third or the sixth or succeeding hours will depend directly upon how easy the model is to control together with common sense, comfort throughout the endeavor, and proper relaxation.

After two and a half hours the wind began to fail. By three hours the glider was down to within 50 feet or so of the cliff top, which has a pronounced point 100 yards North of the trees and a 250 yard cusp to the South. We had to fly accurately along this uneven edge, for there was no lift anywhere else. On those occasions when the wind fell really light the model sank below tree-top level, so we had the

hazard of avoiding the trees as well. At such times it was necessary that the man not flying so position himself that he could call steering instructions while he watched the glider fly through that area which the operator could not see because of the trees. Fortunately, this occured infrequently. Also, while it may sound alarming in the telling, we both knew the model and the technique so well that at the time we were in no way disconcerted.

This continuous dead accurate flying went on until the five-hour mark. A slight freshening of the breeze then lifted the model to about 200 feet, and things became a little less exacting for us. But at five and a half hours, with a vital 30 minutes to go to equal the six-hour open record, the breeze again fell very light indeed. Extreme concentration and accuracy were again necessary to hold the model above the cliff at all. Thus the long sought six hours came and went. Shortly thereafter the breeze swung a little and came in fresher, much colder. Lift became ample although in the cold stable air it remained intensely localized; in fact, the windward edge of lift began to be marked by slight turbulence. This is the first time I have observed this phenomenon.

At 6:12 P.M. (7 hr. 11 mins.) the sun set. By 6:30 P.M. stars were shining, and it was becoming increasingly difficult to judge the model's distance in the failing light. We moved up the slope to a suitable vantage point 100 yards back from the cliff edge, flew the glider back out of the lift and, as it came down and tended to merge into a dark changing background, we had the greatest difficulty retaining any certainty for which way the model was pointed, particularly over the last half minute when it was plunging and rolling in the inevitable turbulence. We were lucky indeed to get it back so that it hit 70 yards from the transmitter, at 6:30 P.M. Total duration: 7 hrs. 37 mins. The model had flown about 169 miles.

Don and I still felt fresh and relaxed. I immediately checked HT and LT supplies, both model and transmitter, and found no significant differences from the voltages checked pre-flight. We unwound the rudder relaytor motor and counted turns: of an available 6,000 we had used 1,860, at a rate of 245 per hour. This rate is much higher than usual, but it is completely explained by the long periods low down when the necessity for absolute accuracy pushed the control rate very high.

It is interesting to review all the improvements which development from Mk 1 to Mk 5 has yielded, then to consider whether this flight would have been possible without them. Speed control, the most important of all, was not used. But this is the only prolonged cliff flight during the past two years when it has not been essential, so this flight must be regarded as unusual. Vastly increased performance, in terms of flatter glide and reduced sinking speed was vital throughout the calmer hours when Mk 5 was riding feeble lift. Mk 1 would have been down by three hours. Use of dry batteries instead of a chargeable accumulator made this flight possible because on forecast the flight was not possible and the accumulator would not have been charged. Significant increase in the number of control turns available due to the geared relaytor was also vital. Unless the reserve is known to be so great that it cannot be used under any circumstances it is not possible to squander turns hour after hour in exacting conditions without worrying—and once worry sets in the irretrievable mistake is not far away. Above all, the quality of the handl-

ing characteristics so painstakingly designed and trimmed into this glider, together with the rigid adherence to a satisfactory flight/rest routine, proved the ultimate difference between a stupid mistake by a tired man at three hours or so, and our quietly flying the model as long as daylight lasted.

It is significant that both Don and I commented that the flight did not impress us at the time as being in any way remarkable. Technically, the flight can perhaps best be summed up as a study in reserves. The radio and control motors were good for three or four times as long. The men were good for perhaps twice as long. Given these reserves, we at last achieved all the airborne time possible in that day's daylight. My experience leads me to believe that the duration actually attained will probably be some proportion of the weakest reserve.

Strangely enough, the radio gear developed by Les Wright does not come into this survey, because it never failed nor gave trouble in the past, and I never expect it to. It has never let me down in 45 hours of witnessed record endeavors, nor in hundreds of hours of flying for fun or development. I take it for granted and forget it. I can pay it no higher compliment.

Early Giants

(*Continued from page* 11)

tractor and pusher pairs and two more tractors were mounted between the middle and upper wings. The craft was 37 ft. 3 in. high!

Total loaded weight was 44,672 lbs., fuel capacity was 1,600 gals., sufficient for 1,090 miles at 91½ mph. Climb was estimated at 13,000 ft.—its ceiling—in one hour. The word "estimated" is used because the Tabor crashed early in its test program through engine failure. Only one was constructed but it did show the wide range of technical thinking that went into large aircraft.

Caproni Triplane

Spanning 130 ft. and about 50 ft. long, the Caproni triplane was the largest "giant" produced in quantity during WW I. Several squadrons were made operative and performed very well against the Austrians. A very light airplane despite its size. the Caproni weighed only 17,700 lbs. fully loaded yet its three engines developed about 1,000 hp, depending on the type fitted. They usually were arranged as a pair of 300-hp tractor powerplants and one 300 to 400-hp pusher. The tractors were arranged in the noses of the two boom-fuselages that carried the tail assembly, P-38 style. A central nacelle, carrying crew and fuel, extended aft of the middle wing trailing edge and housed the single pusher engine. These members were hung from the under surface of the middle wing. A long, streamlined bomb case was attached to the upper surface of the lower wing, underneath the crew nacelle.

The light weight and comparatively high power gave the Caproni triplane favorable wing and power loadings. These were needed to climb over the Italian Alps into Austria and Hungary. Also designed to get in and out of small fields, the Caproni landed at 40 mph, fully loaded. Top speed was listed as 100 mph and ceiling, 16,000 ft. It is said a formation of Caproni triplanes in flight looked like a group of airborne three story buildings!

The N.C. Boats

When the United States of America, birthplace of powered flight, entered WW I in 1917, she was aeronautically far behind the rest of the warring nations. Nevertheless, on November 8, 1918, the first of an outstanding trio of giant American aircraft made its initial flight. That plane was the N.C. 1, of a type that was to make the first transatlantic flight in history, six months later.

The N.C. boats were developed from a series of Curtiss flying boats that had become successively larger with each new type. The N.C. types spanned 126 ft. and were approximately 68 ft. in overall length. Aside from their large size, they were remarkable for their unusually short hull, designed to decrease water resistance on take-off. They differed mainly in the number and arrangement of engines.

N.C. 1 was powered by three Navy Liberty low-compression engines of 330 hp each, driving tractor propellers. Two of the engines were located in the inner bays of the center section about midway between the upper and lower wing, while the third powerplant was situated directly over the hull.

N.C. 2 was then built with four Liberty engines, mounted in tractor and pusher pairs. A pilot nacelle was fitted where the N.C. 1 had its central engine. Engines of the N.C. 3 and N.C. 4 were arranged as three tractors with a pusher mounted in the central nacelle, behind the center tractor. These four-engined N.C. boats grossed as much as 29,000 pounds.

On May 16, 1919, the N.C. 1, N.C. 3, and N.C. 4 left Trepassey, Newfoundland, on their memorable trip. N.C. 1 was forced down by fog and sank before it could be taken in tow by one of the salvaged ships stationed about 50 miles apart along the route to the Azores. N.C. 3, also downed by fog, was damaged on landing but managed to taxi 200 miles to the port of Horta, in the Azores. It was too badly damaged to continue. N.C. 4 managed it to the Azores, and after various delays, arrived at Plymouth, England, on May 31. The longest hop made by the N.C. 4 was from Newfoundland to the Azores, a distance of 1,381 miles, which it made in 15 hr., 18 min. All three ships were fitted with radio direction finders and communication radio plus flame and smoke flares to aid in navigation.

What about the N.C. 2? Early in tests, the wings of N.C. 1 were damaged; N.C. 2 wings were used as replacements. At the same time, N.C. 1's powerplant arrangement was made to conform with that of the N.C. 3. Thus the N.C. 2 became a "spare parts ship."

The German Giants

Germany approached the "giant" airplane problem in a very different manner than did the Allies. England, France, Italy and the United States produced "giants" as the result of a normal development of smaller types. The Germans didn't bother working up to their huge planes—they jumped right into the program by building a monster three-engined biplane with a wing span of 138 ft. 5½ in., and an overall length of 80 ft. 4 in. Methodically they established the "R" class for huge aircraft, which stood for Riesenflugzeug, literally, "giant flying machine".

Oddly enough, however, the German "giant" program was the result of very peaceful intentions. Early in 1914, the pioneer German aviator, Helmuth Hirth, with Herr Klein, a director of the Bosch magneto firm and Herr Maybach of the Maybach engine concern, launched plans to build a large airplane for a transatlantic flight. Their goal was a two-stage hop from Germany to the World's Fair in San Francisco, California, in the summer of 1915.

The war, however, interfered with these plans. Graf Zeppelin, the "dirigible master" who had been slated to finance the project, hired Professor A. Baumann from the Stuttgart Technical College to redesign the "giant" into a bomber. It was to carry 1000 kgs. of bombs over a range of about 400 miles. Zeppelin rented a hangar from Gothaer Waggonfabrik (who made the Gotha bombers) and began construction. This, the first of the German "giants" was test flown by Helmuth Hirth early in 1915. In May the same year it received its final stamp of approval from the Imperial Air Service.

This huge airplane was known as the VGO II, after the initials of the company formed for its manufacture, the Bersuchsbau Gotha-Ost. It was a three-engined monster spanning 138 ft. 5½ in., and 80 ft. 4 in. long, powered by 240-hp Mavbach engines originally designed for the Zeppelins. One engine was carried in the fuselage nose, the other two installed as pushers in nacelles between the wings. This original 1914 design must have been a good one, because eleven different models changes were made in the design and limited production of some models was achieved. Included in the variations were four and five-engined models, but the dimensions and wing area were basically the same as in the original VGO II.

Late in 1916, the VGO organization became the Flugzeugwerft Staaken and became a subsidiary of Zeppelin. Thereafter, this series carried the name Staakener, abbreviated "Staak". The few models of which more than one was built were constructed under license by Aviatik.

These huge Staakeners presented many problems never before experienced by aircraft designers. One was the maintenance of power at high altitudes, an important factor in ships that normally were under-

(*Continued on page* 60)

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powered anyway. This was solved by development of crude superchargers. There were multi-stage affairs usually driven directly by the engine they supercharged.

The Riesenflugzeug program resulted in the letting of contracts to other manufacturers for "R" type aircraft. Such aircraft exceeding the 125 ft. wingspan requirement for this article were the Linke-Hoffman R.II, the Dornier Rs. I flying boat and the Siemens Schuckert R.VIII.

Linke-Hoffman R.II

This unusual airplane had the configuration of a normal biplane, except for its biplane tail assembly. It was poweerd by four 260-hp Daimler (Mercedes) engines mounted inside its cavernous fuselage, and geared together to drive one tremendous propeller 22 ft. 8 in. in diameter! The Li-Ho R.II had open cockpits for pilot and gunner in the conventional manner. The landing gear, mounting dual wheels, looked very commonplace and the biplane arrangement, center section struts and all to hold the upper wing off the fuselage, followed standard practice. This airplane flew successfully but crashed early in its testing program. Its upper wing spanned 138 ft. 4 in., and the fuselage was 66 ft. 7 in. in overall length.

Dornier Rs.I

Next largest German "giant" was the Dornier Rs.I, a biplane flying boat with conventional hull giving the ship an overall length of 89 ft. 10½ in., and a wing span of 142 ft. 9 in. Three 240-hp Maybach engines mounted on the lower wing drove pusher propellers. Most unusual feature of this airplane, besides its size, was its all-metal frame, metal-covered hull and fabric-covered wings.

Siemens Schuckert R.VIII

Biggest of the German "giants" to be flown during WW I was the SSW R.VIII. Construction of this monster began in 1917 and it was completed and first flown in the summer of 1918. Most powerful of the "giants," the R.VIII carried six 300-hp Basse & Selve engines mounted inside the fuselage. Arranged in pairs, the six engines were geared to two tractor and two pusher propellers mounted between the wings in tandem. Power was transmitted through an intricate system of gears and drive shafts.

Its huge biplane wings spanned 157 ft. 6 in., but the overall length was only 68 ft. 5 in. Steel tubing, duralumin girders and sheet aluminum were the prinicpal materials used in the R.VIII's construction. Except for a metal-skinned forward section, it was fabric-covered.

The fact that the Germans chose to "bury" their engines, rather than hang them in the open as the Allies did, caused them many headaches. Their attempts at perfection brought out some very interesting developments.

Superchargers, for example, were finally produced by three firms: Brown, Boverie; Schwade, and Siemens Schuckert. And they helped solve the power problem. The usual procedure was to engage the supercharger at about 3,000 ft. altitude by means of an automotive type clutch. In tests, a supercharged Staakener R.VI could climb to about 18,000 ft. in a little over 1½ hrs., where the same ship, unsupercharged, required two hours to get to 10,000 ft.

Arranging engines within the fuselage, and the attendant gearing and shafting brought about some tough design, lubrication and gear box cooling problems. In turn, the starting of geared engines had to be accomplished. Since it was impractical to swing the huge propellers by hand to start the engines, the Bosch company developed an electric starter, driven either by storage batteries located externally and internally, or by a generator driven by a small gas engine located within the aircraft.

This was the birth of the ancillary power system. Power also was required for other purposes. The German "giants" often carried a miniature telephone exchange aboard, so the crew members could communicate with one another. The Staak. R.VI, for example, carried an engineer who operated the powerplants. He had to communicate with mechanics located in the ship's nose and in the outboard engine nacelles. The phone system also connected the pilot and plane commander with the gunnery positions. The entire system was operated by a communications man who also operated the radio transmitter and receiver. Since a bell or buzzer could not be heard, the generator also provided power for an electric flasher call board located at each crew station.

Other electrically driven apparatus in many of the German "giants" included compasses, certain engine instruments duplicated at the engineer's or mechanics' stations, and one of the earliest artificial horizon instruments, which contained an electrically driven gyroscope.

Cockpits of these "giants" were very much like modern transports. Side-by-side seats for pilot and co-pilot were separated by an engine control stand containing throttles, spark controls and trimming controls. Engine and flight instruments were located on panels in front of the pilots. Other checking and navigation instruments were located overhead in the ceiling.

War Record

Although the German "giants" may have been more technically advanced, their war record was little to be proud of compared to the fine service records made by certain Allied craft. In all, 50 airplanes were constructed in Germany under the "R" classification. Of these, it is known that 31 were sent to the Front at various times for service testing. Beginning in 1917, about Christmas time, and continuing through July, 1918, a number of service flights were made, with London and Allied coastal targets as objectives.

While the record is rather obscure, it is known that most of the "giants" either were lost at sea, or crashed in take-off or landing; two were known to have been shot down in France.

Those used to raid England were the Staakener types. The night of May 9 and 10, 1918, three ships started to bomb London. One crashed on take-off, the other two were lost at sea after being shot up by English night interceptors.

On June 4, a Staak. R.VI was forced down at night behind the French lines and crashed into kindling, killing another eight-man crew. On August 10, a five-engined Staakener R.IV was downed by anti-aircraft fire over France and was totally destroyed when a couple of its bombs went off in the crash. Another is reported to have landed in England, but was totally destroyed by fire set by its crew.

While a number of "giant" aircraft have been built since WW I, it still seems fitting to honor those pioneers who had the courage to literally walk where angels feared to tread. Knowledge always will be acquired as the result of experience with something unknown. We can thank manufacturers like Handley Page, Caproni, Tarrant, Kennedy, Curtiss and the German "giant" builders for at least finding out what not to do when building outsize airplanes.

Pointers on Stunt

(*Continued from page* 15)

The ideal condition in the vertical plane is for the thrust line to pass through the center of drag. This eliminates the tendency to turn tighter one direction than the other. Our elevator would work best if operated out of the downwash from the wing, but this would mean placing it high on the fin which is structurally unfeasible. We normally place it above or below the wing an inch or so, and let nature take its course. Since we have proportional control over the elevator at our finger tips, (Hah!), we can make the minor corrections necessary without much thought. We do wish to keep it from being blanketed by the wing in tight maneuvers where the trailing air is a big mass of eddies and burbles. If you are the artistic type who tends toward weird arrangements, tread lightly, friend. Try to evaluate what your setup will do and compensate for unusual force arrangements with control movement. Get too far off base and you are in trouble.

Now about the landing gear. We have done much research in an effort to iron out landings. Ordinary steel wire gear has a nasty habit of grasshoppering a landing when you least expect it. Reason is the high spring rate of the steel itself. You have probably heard that steel is more elastic than rubber. S'true. It stores the energy from the plane touching down and gives it all back at once. Result, it throws the ship back into the air. With masterful technique and practice, good wheel landings have been made, but we wanted something to plop down from left field with no bounce.

Taking a page from the light plane book, we worked on rubber-loaded gear since rubber doesn't spring back as fast as

(*Continued on page* 62)

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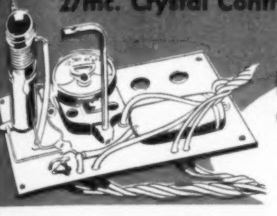

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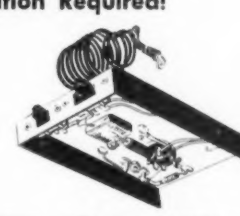

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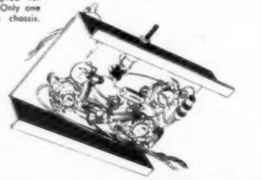

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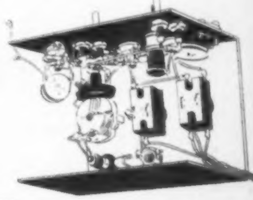

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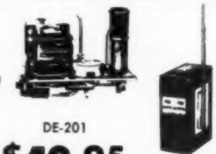

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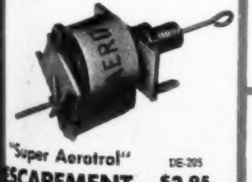

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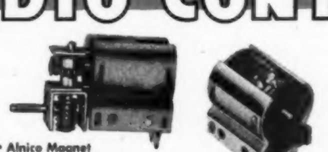

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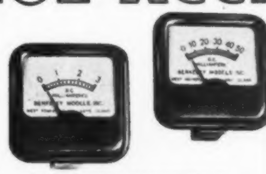

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ADVERTISING INDEX—APRIL, 1957

steel. Results were amazing. The gear sketched is used on the Gold Brick which tips the scale at 44 ounces. We bounced one landing out of about 40 with it. Main points to watch are: Be certain the wheels are toed in at least two degrees or more; use just enough rubber to support the ship on a rough surface (ours collapses on linoleum) and keep the center line of the bearings parallel to the center line of the airplane in both side and top view. Be sure you install the rubber shock cords in an accessible area since they do wear out. Location of the gear fore and aft should fall on a line 20 degrees forward of a vertical line through the CG. Tricycle gear should have the main gear on a line 15 degrees from vertical through CG and aft of CG (naturally). Trike gear should track straight and the airplane should rest on the ground with the wing at about two degrees negative AOA. This enables you to hold down elevator and stick the plane on the ground. If you have a positive AOA at rest you will have no control of takeoff or landings.

If the spot landing is continued a wheel brake is quite helpful. If you are not using rubber-loaded gear, use 3/32" wire on the heavier ships, two lbs. and up, and brace it at the fuselage to prevent it from flexing and bouncing you sky high. If you hit wrong you are going to bounce anyhow, but flexible gear will help if your approach is good. Keep the tread wide, around a foot, use 2½" dia. wheels or over and make sure it tracks properly.

Ted Martin has covered the engine requirements and they haven't changed at all. Keep it clean, and if possible use one engine for nothing but stunt. Get to know it like yourself. If you are in doubt about which engine to buy, we recommend a .29 or .35, and ask the man who wins consistently in stunt what he likes.

Assuming you end up with our average size airplane weighing 2 to 3 lbs., you will get the best results from a 10x5 or 10x6 prop. Almost any brand with a broad blade will do. Try each and pick the one that gives the smoothest flight. The 19's run best on 9x5 to 9x6. Balance all of your props carefully to save engines, airplanes and nerves. The balanced prop is one mark of an expert. Most commercial brands are close, but the perfect balance is achieved by hand work which is expensive.

The fuel tank has ceased to be the monster it once was. Good commercial tanks are available and plenty of information is ready for the experimenter. The October 1953 issue of MAN shows several concepts for tank layout. For most engines the three-ounce size runs about five minutes which is about right. The author favors the rectangular tank with seven-degree slope on the rear end and a single crossover vent pipe. This was developed by Lou Andrews and is a good formula. Ask 10 guys what kind of tank they use and you will find 10 different shapes, all of which work best. Pay some attention to the tank though: Attach it securely, and be sure it cannot develop leaks (at least for a while). Level it up very carefully and be certain the center line of the needle valve is on the center line of the tank, both horizontal and vertical.

To tie the last knots in this string of information, suppose we look over one of the best stunt ships and see what does what and why. We picked Smoothie, one by the "Old Maestro" Bob Palmer, for a couple of reasons. We have built and flown it and we feel it does a fine job of slipping through the AMA pattern. Bob says he has no formula for his airplanes which means he uses a logical sequence of cut and try dimensions from one airplane to the next. The results speak for themselves. The idea was for a smooth-flying ship for use in windy weather as well as calm. Hence the area came out around 450 sq. in. with 50 sq. in. of flap, while the wing tips were made elliptical to eliminate the wobble. Airfoil is 15% thick, at 45% of chord, which should cause the center of lift to fall at about 38%. We then have about 1¼" moment for the CG, which is a fairly nose heavy trim. To force the CG to this spot and to improve the smoothness, the nose moment arm is around 12 inches while the tail moment arm is about 16.5 inches. Stab and elevator area is about 100 sq. inches with about 45% of the area movable.

Bob moves his elevator 45° max. both ways and flaps 30°. The excessive elevator motion is due, in part, to the nose-heavy optimum CG location and the smaller than normal elevator area. He says the CG must be there, and my experience backs him up. The author's duplicate weighed in at 36 oz., most of them are between 30 and 38 oz. The side area is kept small and a 32 sq. inch fin is used. Landing gear is placed well and makes for good wheel landings. Thrust line will pass through the vertical center of drag nicely, thus giving a good tug both directions. Flaps are used and follow accepted procedure on taper. I understand Bob was the first to use flaps as well as a number of other firsts in stunt design. Outboard panel is 2 inches shorter than the inboard and has ¾ oz. of lead in the tip. He recommends little engine and rudder offset; depending largely on speed and CG yaw for tug which is quite adequate. Recommended speed is 70 MPH and the ship goes around corners like she was on rails.

To sum all this up we would like to emphasize practice and consistency while flying. Learn what your ship will do and what it won't do. Build carefully and take your time with construction and finish. When you go to a contest be prepared to win. Be ready ahead of time. The standing joke is a flier finishing his model on the field, but these guys are rarely in the winners circle. Learn how to relax while flying—wish I could. We go to contests to see how well our ships compare to everyone else's. If you are beaten, find out why and do better next time. We all have lots to learn and contests are the place to do it. Above all, have fun. Hope you have learned as much reading this as the author did writing it.

The list of preferred reading is:

Model Aeronautic Encyclopedia—Vol 2, 1951-52 Model Aeronautics Yearbook; Model Aeronautic Made Painless, 1953 Model Aeronautic Yearbook.

Above available from: Model Aeronautic Publications, Box 333, Sta. D, New York 3, N.Y.

NACA Report #824 at $1.50; NACA Report #586 at $1.50. From Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Model Airplane Design and Theory of Flight—Charles Hampson Grant.

Contest Calendar

MARCH

10—*Arcadia, Calif.* Class AA FAST Club Team Race. Edward S. Hartranft, Contest Director, 7609 McGroarty, Tujunga, Calif.

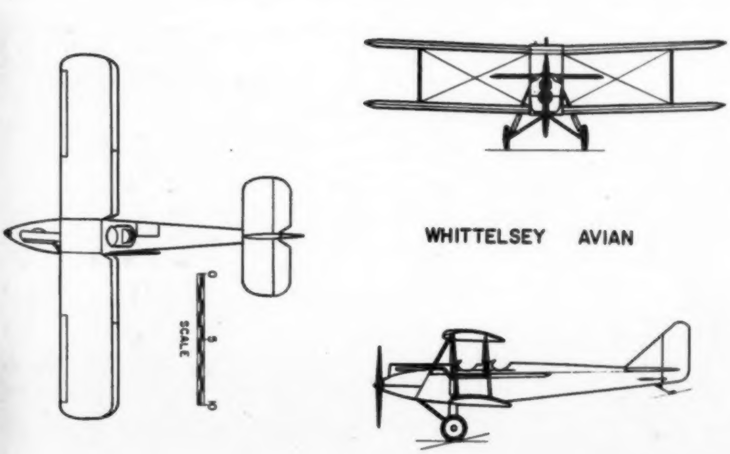
17—*Markham, Ill.* Class A Chicago Prop Nutz Nordic Towline Contest. Restricted to CPN members. Peter J. Sotich, C.D., 3851 W. 62nd Pl., Chicago 29, Ill.

17—*Tulare, Calif.* Tulare Sky Kings' Record Trials for FFG. Don Peacock, C.D., 912 Apricot, Tulare, Calif.

17—*Ventura, Calif.* Class AA Elmination Combat Meet. L. W. Cozad, C.D., 1264 N. Ventura Ave., Ventura, Calif. Pending.

17—*Ft. Worth, Tex.* CRA Record Trials for all outdoor classes. E. E. Scott, C.D., 7409 Arlie, Ft. Worth, Tex.

24—*Taft, Calif.* Taft Model Airplane Club Record Trials for FFG. H. E. Owen, C.D., 417½ Van Buren, Taft, Calif.



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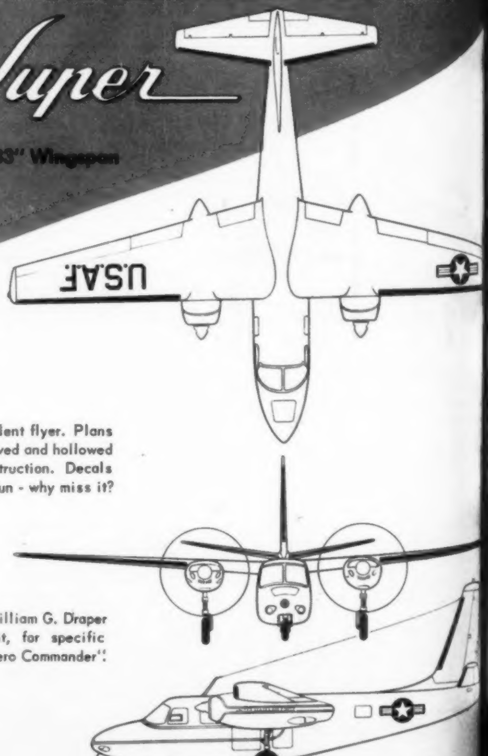
A beautiful twin engine model, and an excellent flyer. Plans are highly detailed for rapid assembly. Carved and hollowed fuselage and nacelles greatly simplify construction. Decals are authentic. Twin engine flying is really fun - why miss it?

Berkeley Models is indebted to Lt. Col. William G. Draper U.S.A.F., Air Force Aide to the President, for specific details of President Eisenhower's L-26 "Aero Commander".



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Here is the model contest fans have been waiting for, designed by "Woody" Blanchard, two-time Grand National Champion. Woody used this model to win the 1955 Nationals and the 1956 Tangerine Internationals. The model is primarily designed for .15 engines, but can use engines between .09 and .19 displacement.

The kit is complete with prefab wood parts, silkspan covering, and a big detailed Berkeley plan with contest winning hints, etc.

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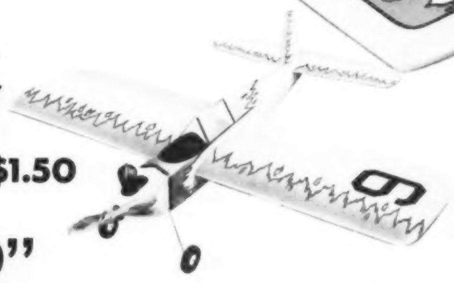

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